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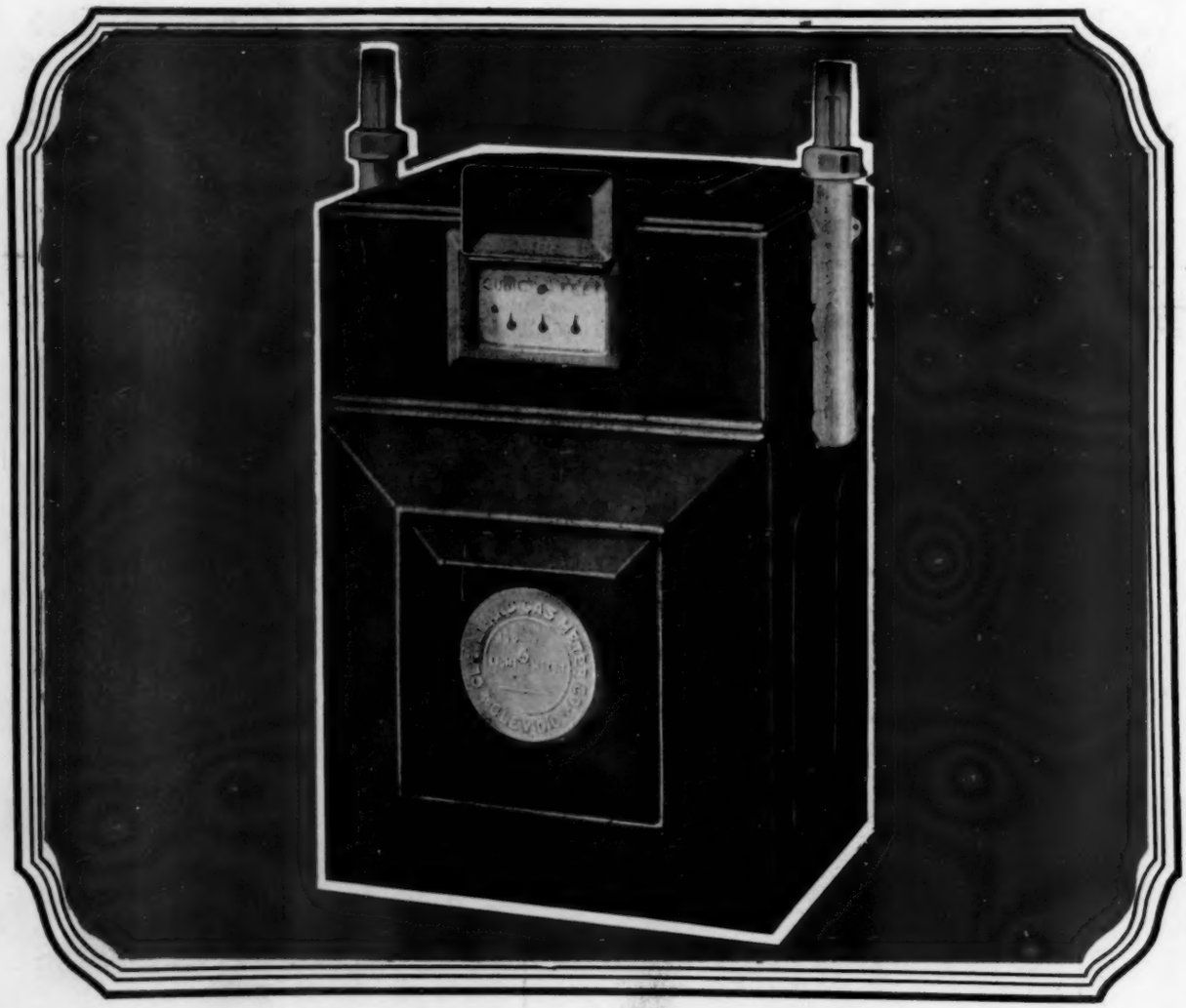

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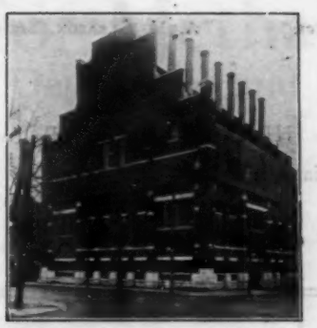
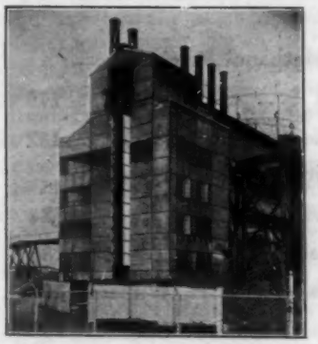
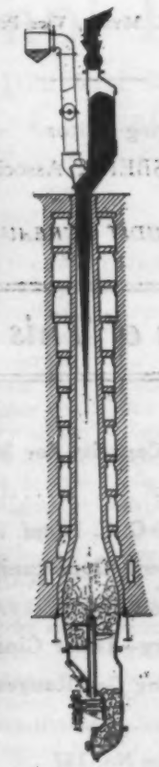


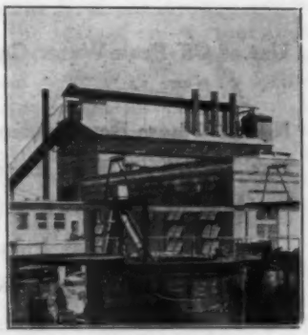
Toronto, Ont.
5,000,000 cu. ft. per day

Fargo, N. D.
800,000 cu. ft. per day



Portland, Me., 2nd Plant
750,000 cu. ft. per day





Fall River, Mass.
1,600,000 cu. ft. per day

Views of Plants *Completed* in 1926

Also Completed

Stamford, Conn.	1,100,000 cu. ft.
Buenos Aires	3,500,000 cu. ft.

Under Construction

Springfield, Mass.	2,800,000 cu. ft.
Toronto, Ont. (ext.) ..	600,000 cu. ft.
Santiago, Chile	3,000,000 cu. ft.

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American Gas Journal

SIXTY-SEVENTH YEAR

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AMERICAN
GAS JOURNAL
Established 1859— Pioneer of the Gas Industry

Vol. 126. No. 8. **NEW YORK, FEBRUARY 19, 1927.** **Whole No. 3620**

Use of Off-Peak Water-Gas Capacity for Methanol Production[1]

Description and present status of the process

A. C. Fieldner
Chief Chemist, U. S. Bureau of Mines

IN 1925, at a symposium on motor fuels and oil conservation held under the auspices of the American Chemical Society in New York City, the writer called attention to the possibility of utilizing the off-peak or summer season water-gas capacity of gas plants in the production of methanol or "Synthol," when the declining petroleum supply should necessitate supplementing gasoline from other sources.[2] This suggestion was made solely on the basis that in the summer months when the need for motor fuel is greatest, gas plants have much idle capacity which must be maintained to carry the peak loads of the winter season. No estimate was made of the economies of such a combination because of the lack, at that time, of cost data on the manufacture of methanol. Most gas engineers believed that the investment cost of the methanol equipment would be much greater than that of the idle water-gas equipment, therefore no economies would result from such combination of gas and methanol manufacture. Since 1925 a little information has become available through the work of Georges Patart, in France, on the manufacture of methanol and other synthetic products from water-gas, especially with regard to the catalytic materials, the degree of purification of gases required, and the yields obtained. Although Patart's published data are rather fragmentary, his paper at the International Conference on Bituminous Coal held under the auspices of the Carnegie Institute of Technology in Pittsburgh last November gives some figures on plant investment, yields, power required, etc., on which rough estimates of costs under American conditions can be made. It is my purpose to give such an estimate in this paper in the hope that it will give the gas engineer some idea of whether the use of off-peak capacity for the manufacture of methanol may have any future possibilities in the gas industry.

[1] Published with permission of the Director, U. S. Bureau of Mines.

[2] Fieldner, A. C., and Brown, R. L., Complete Utilization of Coal and Motor Fuel; *Oil, Paint, and Drug Reporter*, Oct. 5, 1925, pt. II, pp. 12-13; also in *Blast Furnace and Steel Plant*, vol. 14, 1926, p. 138.

History of Methanol Synthesis

The first intimation of the synthesis of alcohols from carbon monoxide and hydrogen by passing a suitable mixture of these two gases at high presures over a heated catalytic material was contained in a patent (German patent No. 293,787 and U. S. patent No. 1,201,850 filed February 11, 1914) on the catalytic hydrogenation of carbon monoxide, taken out by the Badische Aniline and Soda Fabrik in 1913. From the text of this patent it is evident that pure methanol was not obtained, but a liquid forming an oily and watery layer; the former consisted of hydrocarbons, the latter of alcohols, acids, and aldehydes. Pressure up to 120 atmospheres and temperature of from 250 to 400 degrees C. were employed. Seemingly, no further work was done during the World War, and nothing more was published until 1921, when Calvert,[3] in England, claimed a yield of methanol amounting to 80 per cent of the theoretical. Evidently the Badische Company and Franz Fischer in Germany and Patart in France also began research about this time or soon after, judging from the subsequent patents granted and papers published. This research work was conducted very quietly, and even chemists did not suspect that a commercial process was operating in Germany until late in 1924, a few months before the first importations of methanol arrived in New York. Prior to this, in 1923, Fischer and Hans Tropsch[4] published some papers on the catalytic formation of "Synthol" from water-gas under pressure, but these papers were relatively unnoticed, as the product "Synthol" was a mixture of alcohols, hydrocarbons, and other compounds similar to the products claimed in the Badische patents of 1913. Furthermore, the yields obtained were low and the work was admittedly in the purely laboratory stage.

The Badische Company began manufacturing methanol about the middle of 1923, judging from the

[3] Calvert, *Chem. Age* (London), vol. 5 (1921), p. 153.

[4] Fischer, Franz., and Tropsch, *Brennstoff-Chem.*, vol. 4 (1923), p. 276; vol. 5, (1924), p. 201.

data following (Table 1) of German exports of refined methanol.

Table 1—German Exports of Refined Methanol in Metric Tons

Year	Total Exports	Exports to U. S. A.
1921	1121	....
1922	1632	....
1923	3451	....
1924	4207	....
1925	8902	1813
1926 (6 mo.)	5366	1213

Since 1923 the Badische Company has taken out many patents referring to catalysts, purification of gases, and other phases of methanol preparation. Naturally, both Patart and the Badische Company claim priority in discovery. Patart's French patent was filed in August, 1921, and published in July, 1922. Early in 1925 Patart published the first technical paper describing his experiments. In the same year Audibert, another Frenchman, also reported making methanol by a similar process. The latest description of the process of synthesizing material is given in Patart's paper[5] read at the Coal Conference.

Description of the Patart Process

Patart's process consists of compressing water-gas to high pressures (200 to 850 atmospheres), at temperatures of 350 to 400 degrees C. in the presence of catalysts. Mixtures of zinc oxide and chromium oxide were mentioned by Patart as being the best. On account of the deleterious influence of iron and of nickel, the catalyst chamber should be lined with copper, aluminum, chromium, or any glaze impervious to hydrogen and carbon monoxide. Ordinary blue-gas, as for example, one consisting of 50 per cent hydrogen, 33 per cent carbon monoxide, 6 per cent carbon dioxide, 5 per cent methane, and 6 per cent nitrogen may be used after removal of sulphur and carbon dioxide.

Pressures and Losses.—The apparatus is designed to permit working pressures up to 850 atmospheres in order to maintain a partial pressure of carbon monoxide and hydrogen sufficiently high for rapid reaction in the presence of the inert gases which are permitted to reach 40 or 50 per cent of the mixture before purging. From 20 to 30 per cent of the active gases is lost in purging and about 6 per cent by leakage, leaving a net conversion to methanol of about 64 per cent of the gross mixture supplied by the gasification of the coal. The purge gases amounting to 15,000 cubic feet per ton of coal have a heating value of about 400 B.t.u. per cubic foot, and can be utilized for power production or other purposes.

Yields.—The theoretical yield by complete conversion of 1,000 cubic feet (0° C. x 760 mm.) of a mixture of 1 CO:2 H_2 is 29.77 pounds or 4.5 gallons of methanol. The thermal efficiency is 84 per cent. The practical yield as given by Patart is 2.54 gallons of methanol and 300 cubic feet of 393 B.t.u. gas per 1,000 cubic feet of water-gas. If we assume a yield of 50,000 cubic feet of water-gas per short ton of coal, the yields are 127 gallons of methanol and 15,000 cu. ft. of 393 B.t.u. gas (net calorific value) per ton.

Cost Estimate for Methanol Production in United States

Patart estimates that the total plant, including water-gas machines and purification equipment necessary for the production of 20 metric tons (2204 lb.) of methanol per day would cost $400,000 to $500,000 in France, and the total cost per gallon in the United States should not exceed 20 cents. However, these figures can not be applied to American conditions without modification for higher prices for plant and equipment on account of the much higher labor cost in fabrication and construction. It is likely that the plant investment in this country would be twice that given for France. Other items would also vary from the French conditions. I have, therefore, prepared the estimate given in Table 2, based on the following data taken from Patart's paper:[6]

Investment cost in France of 20-metric ton per day methanol plant, including water-gas generation and purification=$500,000.

Electrical energy per kilogram of methanol obtained=2.8 kw.-hr.

Labor per 3,000 cubic meters of gross gas used (not including labor in manufacture of water-gas)=2 man-days.

Repairs and upkeep=5 per cent of plant cost.

Practical consumption of crude gas per kilogram of methanol=3.67 cu. m.

Practical consumption of crude gas per metric ton=3670 cu. m.=129.55 M. cu. ft.

Investment cost of water-gas and methanol plant for American conditions=2 x $500,000=$1,000,000.

The net cost of the methanol plant is calculated as follows: A blue-gas plant with a daily capacity of 20 million cubic feet has been estimated[7] to cost $1,000,000, which amounts to an investment of $50 per 1,000 cubic feet of blue-gas capacity per day. A methanol plant with a daily capacity of 20 metric tons requires 2,600,000 cubic feet of blue-gas, which requires an investment of 2,600 x 50=$130,000. $1,000,000—$130,000=$870,000, net cost of methanol plant $\frac{\$870{,}000}{20 \times 360} = \$121$ = investment cost per ton of methanol per year.

[5] Patart, Georges, Synthetic Methanol and Liquid Fuels from Coal: *Proc.* International Conference on Bituminous Coal, Carnegie Institute of Technology, Nov. 15-18, 1926; also *Tech Engineering News*, Dec. 1926, pp. 260-262.

[6] Patart, Georges, The Industrial Transformation of Bituminous Coal Into Organic Technical Products: *Proc.* International Conference on Bituminous Coal, Carnegie Institute of Technology, Pittsburgh, Pa., Nov. 15-18, 1926.

[7] Brewer, G. S., and Hatmaker, B. J., A Fuel Program for the City of Buffalo, New York: Bulletin published by City of Buffalo, New York, 1922, p. 82.

Table 2—Estimated Cost of Producing 1 Metric Ton of Methanol in a 20-Ton Per Day Plant Costing $870,000, Not Including Water-Gas Plant

		Per Cent of Total
1. Fixed charges:		
Interest on investment, 6% of $121..	$7.26	7
Amortization, 10 years, 10% of $121	12.10	11
Repairs and upkeep, 5% of $121....	6.05	6
Insurance and taxes, 3% of $121....	3.63	3
	$29.04	27
2. Materials, supplies, energy:		
Water-gas, 130,000 cu. ft. at 25c per 1,000	$32.50	31
Electrical energy, 2,800 kw.hr. at 1c..	28.00	27
Supplies, catalysts, etc.	3.00	3
	$63.50	61
3. Labor and salaries:		
Labor, 2 1/5 man-days at $5 a day....	$11.00	10
Salaries, ¼ man-day at $10 a day....	2.50	2
	$13.50	12
Total cost per metric ton of methanol	$106.04	100

$$\text{1 metric ton of methanol} = \frac{2204}{6.675} = 330 \text{ gal.}$$

$$\text{Cost per U. S. gallon} = \frac{106.04}{330} = \$0.321.$$

Credit for purge gases:

30 per cent of gross gas=0.30 x 130,000=39,000 cu. ft,

Value, at 20 cents per 1,000 cu. ft.=0.20 x 39,000=$7.80.

7.80 ÷ 330=2 cents per gallon credit.

Net cost of methanol per U. S. gallon=0.32—0.02=$0.30.

Methanol plants at the mine could probably reduce investment, power, and water-gas charges 4 to 5 cents a gallon, and with experience in plant construction, costs in the plants most favorably situated might ultimately approach 20 cents a gallon; but the first plants constructed will probably have to reckon with a manufacturing cost of 30 cents a gallon. Quotations for 95 per cent methanol at the beginning of the year 1926 were 57 cents per gallon, and at the close of the year the asking price was on a basis of 80 cents per gallon.[8]

Utilization of Off-Peak Water-Gas Capacity

The rapidly increasing growth of house-heating with manufactured gas is presenting a very serious economic problem to the gas industry, as it means more difference between the summer and winter loads. Every effort must be made to utilize this off-peak summer capacity and thus reduce the fixed charges against the winter heating load.

[8] *Chem. and Met. Eng.*, vol. 34 (1927), p. 56.

Views of Patart

The widespread publicity given to the recent European developments in the synthesis of methanol from water-gas has raised the question of whether methanol production is possible as an off-peak outlet for water-gas in the manufactured-gas industry. In his Pittsburgh address, Patart made the following statement:

"From the practical and industrial point of view, to the exclusion of other special considerations, the industry of the synthesis of alcohols would be placed in the most favorable conditions by associating it with the operation of a plant engaged in the production of coal gas for supplying a large city in a coal-mining district rich in bituminous coal. For example, if this plant were operating under the conditions described for Joliet, Illinois, of the Coal Products Manufacturing Company (see W. J. Murdock, Proc. Amer. Gas Assoc. (1924), 766-776) that is, by a series of eight operations of gasification, after which takes place the charging of 2,200 lb. of coal, each operation comprising two minutes for the air blast (blow-run), 2.75 minutes for the injection of steam (50 per cent from below and 50 per cent from the top), and 0.25 minute of purging. The gas intended for the catalytic synthesis would be withdrawn only during the last three operations, and only during the period of the steam injection into the top of the gas generator, which would represent 12 to 15 per cent of the total production. There would thus likely be obtained a gas containing but very little methane and nitrogen (see L. J. Willien, Proc. Amer. Gas Assoc., 1925) and one particularly suited for synthesis. As for the purging gases of the synthesis apparatus, they would be returned to the gas generator during the early part of the steam blast and would restore to the gas production their high caloric power.

"Thus one would arrive at a very economical production that would correspond, according to our calculations, to a net consumption of gas of 2.5 cubic meters per kilogram of pure methyl alcohol and 4.2 cubic meters per kilogram of isobutyl alcohol, which represents a net consumption of raw coal that does not exceed 2 kilograms per kilogram of methyl alcohol and 3 kilograms per kilogram of isobutyl alcohol. At the same time the cost of the original plant would be considerably reduced. The synthesis of alcohols appears, then, from this point of view, to be an adjunct to the manufacture of gas."

Relative Investment Charges and Ratio of Fixed Charges

The possible technical and economic advantages of certain favorably situated gas plants engaging in alcoholic synthesis under the conditions cited by Patart is granted, assuming that there is a market for the product and that the combination is operated throughout almost the entire year. But as regards the use of off-peak capacity, the relative fixed charges of the gas plant and methanol sections of the total operation is likely to be the deciding factor

(Continued on page 18)

New Business Development

Collecting and tabulating useful data

G. C. Klopf

Commercial Manager, North Continent Utilities Co rporation, Chicago, Ill.

EVERY manager of a New Business Department has plans of some kind to increase his merchandise sales from year to year, all of which are more or less based on his past experience as well as the experiences of other sales managers in kindred lines. This subject is an ever interesting one to all concerned, and especially to those of us who believe we are getting the maximum amount of business that can be secured in the territory served by our company. Therefore, we are naturally using various sales methods in building up merchandise sales, taking into consideration the growth of the community, local business conditions and the class of customers served.

Merchandise

One of the first steps to be taken in the sale of gas consuming appliances by the gas company is to adopt appliances that are efficient and economical, which can be sold to its customers at reasonable prices, and which will in turn show a fair profit. Very little difficulty, if any, will be had at this time in selecting the proper type of gas consuming appliances to be recommended and sold if one will take the proper care in making his selection from the appliances tested and approved by the American Gas Association.

Primarily, the purpose of the sale of appliances by the gas company is to increase the use of gas. This can only be done through efficient and economical gas appliances. It can be readily understood that if customers are having difficulty or are not satisfied for any reason with their gas range, considerable sales resistance would be met in trying to interest them in additional gas appliances. On the other hand, if the customers' gas appliances are giving satisfaction, it opens the avenue for future sales of additional appliances for other uses. Experience has taught us that the majority of high bill complaints are among customers who are using antiquated or inefficient gas equipment. Gas companies having an organized sales force which is kept intact permanently and which is actively engaged in the sale of quality merchandise, have found that their high bill complaints are reduced to a minimum and their public relations good.

The housewife of today realizes the value of household appliances which lighten her household duties and recognizes the importance of purchasing appliances for the home that are reliable in service and economical in operation. This she has perhaps learned through the experiences of the man of the house, who insists upon having labor saving devices in his place of business so that he will be able to do his work more conveniently and efficiently. She must put across this same idea to her husband in order to get his co-operation in the purchase of modern household appliances. Therefore, our message must be left with the housewife in such a manner that she can readily understand it and correctly convey it to her husband.

Sales Organization

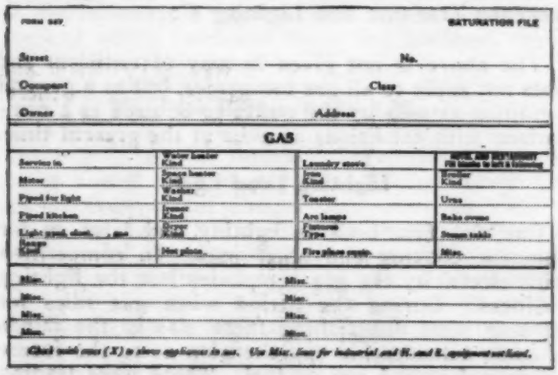
The greatest care must be taken in selecting the personnel for the sales organization. Both men and women in this department must be of pleasing and neat appearance, and of good disposition, ever ready to answer the many questions put to them and to show every courtesy possible to the customer. Too much attention cannot be given these qualifications, as they are essential because of the fact that the sales organization is the closest point of contact between the company and its customers. Its members meet the customers in their homes, which is advantageous from the customers' standpoint, because they are then in a better mood to discuss their problems more freely. And it is here where the sales organization can do the company considerable good in building up good will.

Best results can be obtained by the average gas company building up a sales organization large enough so that the territory can be divided into districts of approximately 2,500 residential customer to the district. Districts larger than this cannot be thoroughly covered. Districts too small will not be sufficiently productive to warrant maintaining a salesman. A merchandise sales quota and sales-appliance-possibilities quota should be carefully worked out for each district. With these facts before the salesman he knows what is expected of him. He should be made to realize that it will be necessary for him to carefully canvass his territory to better acquaint himself with the customers he expects to do business with, as well as to see whether they are satisfied with the gas burning appliances they are now using.

Canvassing

A saturation card, a copy of which is hereto attached for illustration, should be used by each salesman in making his house to house canvass. By carefully filling out the information spaces tabulated on these cards relative to appliances now on the customer's premises, he will have on hand a directory on appliance sales possibilities, and this should be

filed for ready reference. There is nothing laborious about the filling out of these cards. However, they are invaluable when information is necessary during campaigns on various appliances. They are a record of what the salesman saw and information received during his canvass among his customers. This information, if not recorded, is unobtainable, and the real efforts of the canvass wasted.


SATURATION FILE

Street No.

Occupant Class

Owner Address

GAS

Service in	Water heater Kind	Laundry stove	Mixer Kind
Meter	Space heater Kind	Iron Kind	Ironer Kind
Piped for light	Washer Kind	Toaster	Urns
Piped kitchen	Ironer Kind	Arc lamps	Bake ovens
Light yard, stock, ... gas	Dryer Kind	Fixtures Type	Steam table
Range Kind	Hot plate	Five plate range	Misc.
Misc.		Misc.	
Misc.		Misc.	
Misc.		Misc.	
Misc.		Misc.	

Check with cross (X) in above appliances in use. Use Misc. lines for industrial and H. and A. equipment not listed.

Saturation Card.

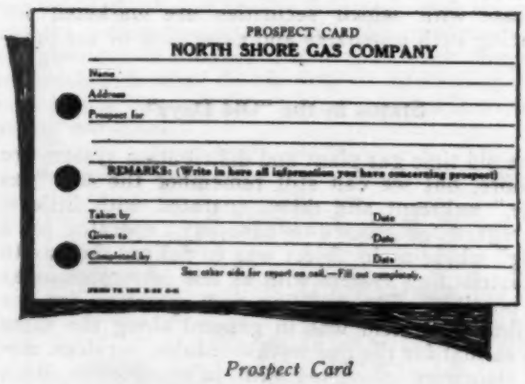
The saturation card system has numerous advantages in the sale of merchandise. It affords information on appliances that the customer already has. For instance, a sales campaign is contemplated on water heaters. These cards can be referred to and customers who do not have gas water heaters can be called upon during the campaign period, thereby saving considerable time. Thus a maximum of sales efforts can be spent on possible purchasers.

In gathering the data for the saturation cards, the best results will be obtained by supplying the salesman with a pocket sized leathtr pouch, containing a small screw-driver and gas pliers, so that minor gas burner adjustments can be made. The servicing kit, as we term the screw-driver and plier outfit, will enable the salesman to gain admittance to the premises to inspect the gas appliances and pave the way for an interview with the housewife under the most favorable conditions. Adjusting appliances by the salesmen is gratis, therefore, this service is appreciated by the customer. The resistance in interesting her in additional gas appliances is reduced to a minimum. However, care should be taken to see that the salesmen are properly schooled to make the adjustments. Any other complaints that they might find during the canvass should be reported upon return to the office so that a shop call can be made to remedy the complaint. Information relative to gas appliances received from the housewife through the screen door or on the porch is unreliable. It should be impressed upon the salesmen that they are largely responsible for the functioning of the gas appliances in their district.

Prospect Card System

It is important that a Prospect Card System be worked out to tie-in with the Saturation Card System. A prospect card, sample attached for illustration, is to be filled out by the salesman during his canvass for prospective customers who express an interest in the purchase of appliances at some near future date. The information on these cards should be self explanatory regarding the appliances the customer is interested in and as to the date a back-call by the salesman should be made. All prospect cards should be turned over daily to the local New Business Manager who will keep them in file with the index cards for the appliance named on the face of the prospect card, and in a position according to the recall date. This filing method will place the prospect cards in the foremost position so they can readily be taken from the file on the dates they are due, to be given to the salesmen to follow up. This scheme will eliminate the possibility of overlooking prospects to be called on when due.

The Prospect Card System will distinguish actual prospects from possible customers who have not the appliances indicated on the saturation card. This will afford the salesman better opportunities of concentrating his sales efforts and enable him to bring about the desired results.


PROSPECT CARD

NORTH SHORE GAS COMPANY

Name

Address

Prospect for

REMARKS: (Write in here all information you have concerning prospect)

Taken by Date

Given to Date

Completed by Date

See other side for report on call.—Fill out completely.

Prospect Card

Daily Sales Meetings

A morning sales meeting should be held each day with the local salesmen, at which time the saturation and prospect cards covering the previous day's business are turned in to the New Business Manager for observation and discussion. The prospect file is then consulted by the New Business Manager, who takes from it all prospect cards due to be called on that day. Each prospect card is recorded and given to the district salesman to call upon. Care should be taken that the salesman does not receive any more prospect cards in one day than he can reasonably call upon. These prospect cards must be turned in at the following morning's meeting with a report relative to the call made, initialed and dated. After this routine a general discussion should be held by the salesmen and New Business Manager regarding experiences of the

(Continued on page 18)

The Gas Industry Offers Excellent Opportunity to the Progressive Young Man of Today

D. A. Powell

Vice-President and General Manager Muskegon Trac tion and Lighting Co.

THE manufactured gas business as a whole is going forward at a rapid pace. The old slogan of "Cook with Gas" has been superseded by the more general one of, "If it is done with heat, it can be done better with gas," and this is not only an advertising theory but has been established as a truth and accepted by gas companies and consumers of fuel throughout the country. A review of statistics for the past year shows the large increase in sales of gas for both domestic and industrial uses, and it is reasonable to believe that the increments of increase will be much larger in future years. The standing of the manufactured gas industry and the confidence with which it is held in the financial world is indicated by the large amount of moneys recently spent for purchase of gas company properties and the ease with which securities are marketed for financing such purchases and expansion of the properties.

Status in the "Old Days"

The old time gas plant and distribution system are no more, but we can still remember the old "gas house," unkempt and dirty, operated with little if any regard for science or economy; operated by a "gang" whose main object was to deliver the gas to the distribution system with as few interruptions as was possible. The building and operation for the distribution system was in general along the same lines as that for the gas works. Mains, services, meters, etc., were connected with, in many cases, little if any regard as to requirements for the future. Premises varied over a wide range and were inadequate for satisfactory and economic operation of appliances. Piping rules were indefinite, if not unknown. Appliances were manufactured, sold and connected with few specifications and regard as to efficiency and design, as to appearance or cost of maintenance. Servicing of equipment and gas consuming appliances was carried out in a more or less haphazard way which did not allow of any too friendly relations between the company and the customer. Rates were set up and applied with no system of application to varying demands and inducements for competition with other fuels used. The general service conditions with unsatisfactory public feeling towards gas companies set up a situation which was easily recognized by corrupt politicians who made the gas companies the brunt of their attacks in their appeal to the voters. Financial returns under such conditions were against securing outside capital investments. In general, the gas industry was handicapped by many such conditions which seriously interfered with its program for a period of time.

The above is not given in way of criticism and does not apply to all gas companies, but as a general condition as seen by the writer to be used as a comparison with conditions as exist at the present time.

Lighting Load Lost

Gas was first used as lighting and later on for domestic cooking and other uses. In competition with electricity the gas companies lost the lighting business. During the period when gas sales for lighting were diminishing there was in the minds of some considerable apprehension as to the future for manufactured gas as fuel. There were leading gas engineers in the country, however, who had made this business their life study, had faith in manufactured gas as a fuel and could visualize a great future for the industry in the sales of gas for the greater proportion of domestic and industrial uses. Through the untiring efforts of these leaders and their associates individually and through their gas associations their dreams have been realized and today the manufactured gas industry is one of the most progressive and substantial industries in the country, if not in the world.

Comparison of Past and Present Conditions

It is very interesting to compare the past conditions with those which exist at the present time. Gas manufacturing plants in general are built along modern lines of construction and are equipped for manufacture and purification with latest type apparatus for dependable and economic operation with low cost of gas in the holder. Old style hand operation in most part has been eliminated by the use of mechanical devices. The several operations in the manufacture and purification of gas have received individual attention along scientific lines; supervision is of a higher grade and has resulted in a better and cheaper gas production. Methods of distribution, design and operation have been revised resulting in less variation in pressures, standardizing of piping and connections as well as of industrial and domestic appliances with better control and servicing of the entire system for continuous and economic service to the customer. Super power-arrangements for gas on a larger scale with concentrated manufacture and long distance high pressure transmission is being rapidly developed and will be general practice in the near future. Rates for gas have been given careful study, resulting in a more equitable cost to different classes of customers which will have a great effect in stimulating sales to practically all classes of users, especially those classed as commercial and industrial.

Advantages of Regulation

In reviewing the wonderful progress as made by the gas industry in recent years, we must not lose sight of the advantages of Utility Commission regulation. While they have not established for us a monopoly in the sale of our product or relieved us from competition, the Commissions have protected the gas industry in general from unfair and unjust practices which burdened them and hindered their progress for many years.

Need for Better Trained Men

This is an age of service. The public demands service and if our industry is to live and thrive in face of ever-present competition, we must supply such a demand. This can only be done through most careful management and supervision of the production and utilization of the gas. Management and supervision mean men; men who are high grade, who have gone through the departments from bottom to top with whole hearted interest in the industry and who can visualize its future with confidence. The need of more young men in the industry for present operation and future leaders, as well as the education of the ones now employed, has been felt by the gas industry and others as is indicated by the recent educational activities of the American Gas Association and colleges throughout the country. Past conditions in the operation of gas properties have not apparently been inducive to the average young man with or without a college education. This in part may have been due to the indifferent attitude of managers in interesting the younger men in their business, assisting him in his routine duties during apprenticeship and providing advancement in position and responsibility at the opportune time. Whatever have been the conditions in the past, the opportunity now presents itself for anyone who has ability and stick-to-it-tiveness and who is willing to apply himself to the work at hand. One cannot expect to learn the gas business entirely from books but must have at least a certain amount of practical operating and construction experience. The amount of literature on gas property construction and maintenance available for direct application to any particular gas property is limited but serves as a guide for a study of conditions and practices in a general way. Many of the gas companies today give their cadets a very careful training in apprenticeship through the several departments of distribution, manufacture, sales, etc., with special attention from experienced heads of departments. Educational courses are supplied and classes conducted for the co-relating of theory and actual practice.

Rewards for the Studious

The men who have successfully gone through the apprenticeship course are being placed in responsible positions, not only in the manufacturing and distribution departments in charge of construction and operation, but in the industrial and domestic sales divisions, as well as the accounting and purchasing departments. The many millions of dollars spent by gas companies each year substantiate the most careful control of material quality and prices. If gas is to compete with other fuels, the best and most efficient appliances must be installed for ease of control and at the lowest possible price to the customer. The operating departments must have accurate unit costs of construction and operation as a guide in their work, that is, they must think in dollars and cents for economic operation and lowest possible cost of gas delivered. The accounting department must in turn get from the operating departments accurate field data as a basis for their unit costs and general accounting. In general, the young man with energy and a willingness to work has, after proper training through apprenticeship, a most excellent opportunity in the several departments of the industry for a position of responsibility with adequate remuneration.

The great progress being made by the gas industry together with required standards of service at low cost to the customer requires the rapid development of trained men in company organizations to take care of present operations and greatly increased future requirements which are now anticipated. Thousands of young men are being graduated from schools and colleges each year. The gas industry needs some of these men. They need the opportunities now offered by the industry. Are we making the proper presentation of this opportunity to the young men of today; if not, let each company and each individual do his duty in interesting these men in our business for the mutual benefit to them and to ourselves.

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The Brooklyn Union Gas Company

Corrosion in the Gas Industry

Ismar Ginsberg

Associate Editor

THERE is no word, pregnant with more meaning, surrounded with more ramifications, than the word corrosion. If we were to pick one problem which is common to all industry and to everyday life as well, a problem which is fraught with more consequence than any other, we would select the corrosion problem. Volumes have been written about it, and still it cannot be said that it has been solved. Industries have been founded just on the attempt to solve it, to prevent corrosion and all its subsequent developments, and still the fight goes on. It certainly is an irony of nature that the most useful of metals, the one that is most widely distributed and that is cheapest, the one that is most easily worked and that possesses in the highest degree the proper mechanical qualifications of a structural and machine-building material; in other words, the metal iron, should possess a disadvantage which, in truth, almost counterbalances all its other good properties. For iron will rust and in rusting introduce all sorts of problems and difficulties which must be prevented from becoming realities. The rusting of iron is indeed the bane of all industry and causes trouble wherever iron is employed, either in the home or in the factory, in building or in the open.

The gas industry is no exception to this rule. It uses large quantities of iron metal in the works and in its distribution systems. There are various pieces of apparatus about the gas works which are expensive and which are made of iron. These must be protected against rusting at all hazards. Thus, when we speak of corrosion in the gas industry we are considering a subject which is close to the heart of the gas engineer, a subject which is constantly receiving attention in all gas works, a matter which connotes eternal vigilance if disaster is to be avoided. The corrosion problem is one that the gas man must give careful consideration.

General Character of Rusting

A few words must first be said regarding the general character of corrosion or rusting. We are using these two words synonymously, although they are not exactly the same, for corrosion can be brought about by other means than rusting. Acids and acid salts will corrode and eat away the iron substance, but acids are not commonly met with on the gas works and unless it is specifically mentioned otherwise in this article, corrosion will simply mean the ordinary oxidation of iron, that is, the formation of rust or iron oxide.

It is always true that if a certain difficulty is to be solved or if a certain trouble is to be remedied, or a process improved, it is first necessary to understand the principles and phenomena that are concerned with it. In other words, if the correct practical development is to be worked out, it is first essential that a sound theoretical knowledge of the matter in question be available. It has often been said that the most practical of all things is a sound, well-founded and well-substantiated theory. Corrosion is no exception to this rule, and the gas man, in order to understand what methods and means to adopt to fight against this ever-present enemy of the metal he uses to such a large degree around the gas works, must be familiar with the theories of corrosion and the fundamental facts that characterize this phenomenon. It is therefore not out of place to spend a little time in studying the exact character of corrosion or rusting and in developing the probable causes and controlling factors.

Corrosion a Form of Combustion

It is perhaps unnecessary to point out that corrosion is a form of burning or combustion. In fact it is as much combustion as the burning of a stream of gas in the burners of a gas stove or hot water heater. The only difference is that gas, or rather the ingredients of gas, such as hydrogen, carbon monoxide, methane, etc., will burn, when ignited, at a high rate of speed and the heat that is evolved in every burning or combustion process does not have a chance to escape with the result that it accumulates rapidly, the temperature rises and under the proper conditions light and flame are emitted. This of course does not happen when the gas is considerably diluted with air so that complete combustion is obtained. The rusting of iron is also combustion, that is a combination of the burnable substance with oxygen of the air, but in this case the burning is so slow that the heat evolved has a chance to radiate and be removed from the immediate vicinity of the burning substance. Hence a piece of rusting iron is not hot to the touch but absolutely cold. Nevertheless, the union of the metal iron with the gas oxygen is combustion, just as much as if the process took place with the evolution of light and sensible heat. To prove this contention the experiment has often been made with iron filings which have been heated and then introduced into a bottle containing pure oxygen gas. The iron will actually burn under these conditions with the production of scintillating sparks, light and heat, and the product formed is the same iron oxide which is known as rust.

Fundamental Aspects of Corrosion

Before going into the discussion of the various theories of corrosion and their relation to the practical side of the question, which is the protection of iron structures and machine from corrosion, it is interesting to set down some of the well established facts surrounding this entire problem. Thus, it is well known that iron will not rust at ordinary

temperatures when there is absolutely no moisture present in the air surrounding it. Corrosion of iron in water will not ensue unless there is an appreciable amount of oxygen dissolved in the water. The combined presence of oxygen and water will produce corrosion, even though carbon dioxide or other acids are not present. As far as corrosion in natural water is concerned, the rate at which the rusting takes place is almost proportional to the amount of oxygen which is dissolved in the water. On the other hand, the presence of oxygen in dilute acid solutions will also accelerate the rusting.

When comparing the rate of corrosion in acids, alkaline and neutral solutions, it will be found that the rate is greatest in the acid solution, next in the neutral solution, and last in the alkaline solution.

The corrosion of a piece of iron is never uniformly distributed over its surface. There are always spots where the rusting is more pronounced than at others. It must be mentioned, however, that the composition of the iron has but little effect on the rusting phenomenon when carried out under water, but it has at times a marked effect when it is carried out in air. It is wrong to suppose that the controlling factor is the homogeneity of the metal, for external conditions are far more potent in affecting this phenomenon. On the other hand, when dissimilar metals come in contact with each other or with electrically conductive material in solution in the water that comes in contact with the iron, then rusting or corrosion is accelerated. This acceleration is due to the electric current that flows through the solution and the metal. It often happens that the composition of the solution, which is in contact with the iron metal, varies. Under these conditions it will be found that the metal will be more corroded at one spot than at another, for the higher the concentration of the salt or electrolyte the less will be the corrosive effect.

Condition of Surface Important

The condition of the surface of the metal may have an effect in localizing the corrosion that takes place under water, but it will not cause more corrosion to take place than would otherwise ensue. The flow of water also has an effect in increasing the degree of corrosion, which is probably due to the elimination of the products of the oxidizing reaction which is always a way in which to increase the rate at which a chemical reaction takes place.

It has been said that corrosion or rusting results in the formation of an oxide of iron. However, what really happens is the formation of a number of oxides simultaneously due to external conditions. However, as far as the engineer is concerned, all he needs to know is that corrosion results in the formation of iron oxide rust which is a friable powder possessing no strength whatsoever in marked contradistinction to the original iron metal.

Corrosion is such a widely disseminated problem that it is not surprising that it has attracted the attention of many investigators who have been concerned not only with the development of methods and means for preventing corrosion but also with the evolution of theories of corrosion. The latter work is of the highest importance, for when the engineer has available a well-founded and corroborated theory of corrosion he can proceed to solve the engineering side of the problem with much greater ease. The fact that it has been delayed in solution and that perhaps the final solution has not yet been reached is due to the unsubstantiated character of the theories of corrosion which have been held up to very recently.

Electrochemical Theory

Of all the theories that have been advanced in explanation of the corrosion phenomenon—and there have been many—the one which appears to be best founded is the electrochemical theory. It is based on one of the most fundamental conceptions of electrochemistry. If a piece of iron, for example, is placed in a solution of a copper salt, for example copper sulphate, then the iron will go into solution but at the same time it will replace the copper in the solution and become coated with a film of the metallic copper. Whether or not one metal will replace another from a solution of the metallic salt depends on the position that the metals occupy in the electromotive series. In the case of water, the iron replaces hydrogen from solution, when it dissolves, so to speak, in the water. The hydrogen gathers in a thin invisible film on the surface of the iron. This film exerts an insulating effect on the further solution of the iron, and if it were not removed in one way or another, further solution would not take place. Thus the first stage of corrosion of iron in natural waters comes to a stop within a short time after it starts.

Escape of Hydrogen Disturbs Equilibrium

But the hydrogen that is gathered in this fashion on the surface of the iron possesses two ways in which it can escape. In the first place, it can be converted into water by union with oxygen which always exists dissolved in the water. Then again it can escape into the air as gaseous hydrogen. Just as soon as hydrogen is removed the reaction, which has been stopped, can start up again and in fact go on indefinitely as long as any iron remains.

This corrosive action of water on iron takes place much more avidly when the water contains acids. The formation of hydrogen is more rapid and the iron will rust away much more quickly.

Of course we do not see the iron actually dissolve in the water, for rusting is accompanied by the formation of an oxide of iron which is generally reddish brown in color. But the electrochemical theory simply states that iron dissolves in water with the immediate precipitation of rust, or iron oxide, and the formation of this rust is evidence of the iron going into solution. It may often happen that the rust formed during the corrosion of the iron will cake hard on the surface of the metal and will thus protect unrusted iron metal from coming

in contact with the water and thus from rusting. This is purely a mechanical phenomenon.

Theory Applies to Other Metals as Well

This is in fine the electrochemical theory of rusting or corrosion of metals. The gas engineer will understand that it applies to other metals and alloys besides iron that are subject to corrosion or oxidation, but we are not interested in any of its manifestations except in so far as they apply to iron. The electrochemical theory applies equally as well in explaining the rusting of iron at normal temperatures only in the presence of moisture. The theory also explains why it is that certain places in the metal will be pitted while others will remain untouched. This indicates a selective rusting action and is due to the difference in electrical polarity and the presence of what are known as cathodic and anodic areas. The increased rusting action due to the contact between dissimilar metals is of course an electrochemical phenomenon, of the character that takes place in the galvanic cell or battery. Experimenters and investigators are now much inclined to give this theory their support for it appears to cover well all the contingencies and variations that arise in the corrosion of metals.

Acid Theory

There are of course other theories of corrosion and while it is not our intention to spend much time in describing them, nevertheless it is felt that their general principles should be known to the gas engineer who is giving this matter of corrosion his attention. Thus there is the so-called acid theory which is based on the assumption that a small amount of acid is always necessary in order to bring about corrosion. The corrosion is initiated by the trace of this acid and in the case of natural water the acid in question is carbon dioxide. This theory seemed to have some merit until it was completely overthrown by the recent work which revealed the fact that the presence of carbon dioxide or of acids was not necessary for corrosion to ensue.

Another theory is known as the colloidal theory, which says that a colloidal ferrous hydroxide is formed in the corrosion of iron and this colloidal substance is then converted into the ferric compound which is then reduced in coming in contact with the iron which is again oxidized by atmospheric oxygen. Thus the corrosion of iron is accelerated. This theory, it is said, is really meant not to supplant but to supplement the electrolytic theory of corrosion.

Direct Chemical Action

Still another theory is direct chemical attack by oxygen which simply means that oxygen attacks the iron metal and converts it into iron oxide which constitutes corrosion or rusting. This would seem to be the simplest of all theories, but the corrosion phenomenon cannot be expressed in such simple terms and many of the characteristics of the rusting process are not explained by it.

Biological theories have also been advanced. These state that there is a certain kind of biological organism which exists in natural waters and which decomposes iron salts to form iron hydroxide. However, there is no organism known that attacks the metal iron and furthermore corrosion can take place in water which is free from all living organisms.

It is of course true that as corrosion products are formed, they build up a film around the corroding metal. The degree to which this film allows further contact between the underlying metal and the corroding medium determines just how fast the corrosion will ensue. There is no question but that the irregular permeability of this film will tend to localize corrosion at one point rather than at another, but this is only a secondary aspect of the corrosion phenomenon and the latter cannot be explained on this ground at all.

The final theory that we must mention here is the peroxide theory which states that water attacks iron with the formation of iron hydroxide and hydrogen, the latter reacting with water to form hydrogen peroxide. The ferrous hydroxide first formed is then oxidized by the hydrogen peroxide with the formation of ferric hydroxide, while the peroxide will also attack the iron to form ferrous hydroxide. There is no ground at all on which this theory can be corroborated.

This in fine closes the theoretical consideration of the theories of the corrosion or rusting of iron. The electrochemical theory is the most plausible of all, for it will be found to explain all the ramifications of this phenomenon, while the others merely explain certain characteristics of the process. The important consideration after all is how the theory works in practice and how means for preventing the corrosion of iron, suggested by a study of the theory, work out when used on a practical scale.

Iron Manufacture and Corrosion

Iron is of course a manufactured product in which basic principles of both chemistry and physics are involved. It is not strange that the question should be asked as to what effect the manner of making the iron will have on its corrosion, and this refers not only to the chemical composition of the raw materials used in the iron and steel making processes and of the finished products, but also to the nature of the mechanical and physical treatment to which the iron or steel is subjected during its manufacture.

It is not necessary to describe here the various processes involved in the manufacture of iron from iron ore and its conversion into such products as steel, wrought iron, crucible steel and the like. It is known that the ore is mixed with coke and flux, or rather that alternate layers of these materials are arranged in the blast furnace and hot air is blown into this furnace, whereupon the iron ore is reduced, the gangue is fluxed and iron is obtained in the form of an impure metal containing varying amounts of sulphur, silicon, phosphorus, carbon and the like, which materially affect its strength and make pig iron useful for but very few purposes when used direct.

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Cashier Co-operation in Selling Gas Ranges

A possible avenue for the sale of more appliances

Frank H. Williams

JUST suppose—

That every month the gas company's range salesman came into personal contact with eighty or eighty-five per cent of all the company's home customers.

And suppose—

That every time the salesman did come in contact with these folks he'd ask them to buy a gas range.

Wouldn't this be a very decided help to the gas company in selling more ranges?

Well, there is an employee of the gas company who does come in contact with eighty to eighty-five per cent or so of the company's home consumers each month and this individual, though not a salesman, might just as well as not ask these folks to buy ranges.

This important individual is the gas company cashier.

Every month all those home consumers who are not delinquent in paying their bills or who do not pay their bills by mail, come in contact with the cashier. The cashier smiles at them, passes the time of day and takes their money but does nothing at all toward asking the folks to buy ranges or any other appliances.

And it does seem as though the cashier in many gas companies could give greater co-operation in the selling of ranges than is now the case.

This doesn't mean, of course, that the cashier should stop her work and give a selling talk to every customer who steps up to the desk to pay a bill. For the cashier to do that would be to greatly interfere with her efficiency as a cashier. But the cashier could, very easily, distribute sales-making literature to home customers and could secure data on such customers which could later be turned over to the range salesman with very good results indeed in helping the salesman to put more sales across.

Prospect Card Box At Cashier's Desk

For instance, it would be a simple proposition to install a box at the cashier's desk and to fill this box with cards on which customers could write in their names and addresses and other data if they were interested in new ranges. These cards, when filled in, could be given to the cashier and by her could be given to the salesman.

With the box there could be a placard reading like this: "Are you interested in a new gas range? If so, sign one of these cards and hand to the cashier."

The cards themselves, in addition to having space for names and addresses of signers, could also have space for their phone numbers and a place for indicating the price of range in which they are interested, the approximate time when they would like to have the new range installed, whether they wished to pay for the range in cash or on time, and so on.

To have this sort of a proposition at the cashier's desk would be to focus the attention of many of the folks on the proposition of buying a range. This would bring many people to the point of making a purchase whereas without something to get them right to the point they might drift along for weeks and months without doing anything. And, as many people take the greatest sort of pleasure in signing their names and addresses, this sort of a proposition would probably get action from many folks who, otherwise, might not act at all.

Follow-Up By Range Salesman

After turning the filled-in cards over to the range salesman he should, of course, follow them up carefully. He would then figure out a definite proposition for each person in accordance with the data obtained from the card and he would present the proposition to the person at the time indicated on the card or immediately, if the card signer hadn't given any date as to the time when she would be most likely to be interested in the purchase of a new range.

In this way undoubtedly a worth-while number of prospects would be put into the hands of the salesman each month and a number of sales might result that perhaps would not have been made otherwise.

Again, the cashier could co-operate with the range salesman in boosting the sales of ranges, handing to each customer some literature about ranges.

For instance, it would be a very interesting thing indeed to many gas customers to have the cashier put into their hands a card or pamphlet giving a roll call of all the recent purchasers of gas ranges from the gas company. Listed on this roll call could be the names and addresses of all recent purchasers with, perhaps, a short sentence opposite each name giving that individual's words of commendation for the range. Appropriate copy could be used with the roll call telling what it was all about and also stating that another roll call would be gotten out in about six months, urging all women who wished to have their names appear on the next roll call to make their purchases of ranges at once. Many women would be quite anxious to get their names so listed, with the result that they might feel an urge to make purchases of ranges. And for such folks a coupon could be provided which, when signed and deposited in a box provided for the purpose, would bring the salesman to their homes.

(Continued on page 192)

Industrial Gas Appliances and Their Uses*

Constant and accurate control of temperature is essential to the successful use of industrial gas appliances. Temperature control equipment consists essentially of two parts. First there must be something that is sensitive to temperature changes. Second, there must be some sort of control valve to control the supply of fuel to the burners.

The "sensitive-to-temperature-variations" element may be a thermometer, thermostat, thermopile or anything that is sufficiently sensitive to temperature variations. The important point is that it have the sensitivity to temperature changes that is necessary to give the degree of delicacy of control that is required and that it be an element that permits of ready mechanical or electrical connection to the control valves.

Control valves are of many different types. Some are simple diaphragm valves operated by gas or air pressure, which is controlled by a small valve operated by the temperature element. Others are electrically controlled, either by a solenoid or motor.

Though there is a wide variation between the details of different systems, all systems have a temperature element and a valve controlling the fuel supply which is operated through the medium of the temperature element. In some cases the connection between the heat sensitive element and the fuel valve is mechanical. In others it is electrical. Some systems use a direct circuit from the temperature element to the valve. Others make use of a relay.

Two Valve Systems

There are two valve systems where one valve controls the air and another controls the gas. The twin valves operate in synchronism and the object is to maintain the same proportionate mixture of gas and air. There are conditions under which it may be very desirable to use the two valve control. On the other hand, toward the end of securing greater simplicity there is a tendency in favor of the one valve control where satisfactory results can be obtained with such control. There is no one system that will meet every requirement. The conditions in each individual case have to be studied and the system used that will give the best results.

It is necessary that we refine, so to speak, the ways in which we apply gas to industrial purposes. Only through refinement of appliances, systems and installations can we get the results that we must get in order successfully to meet the competition of electricity. Efficiency, reliability, dependability, and a heat control that gives the manufacturer using gas a product of the highest attainable quality and a high degree of uniformity with the minimum of defective parts are what we need to sell gas successfully for industrial purposes.

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*Report of talk given by O. M. Olsen, Eclipse Fuel Engineering Co., before Industrial Division of the New England Gas Association at Boston City Club, January 7, 1927.

Necessary to Closely Study Heat Control Systems

Heat control is a very important factor in arriving at these results. Only with the best possible system of heat control can gas be made to give the best possible results. Therefore, it is important that the heat control system be given very careful consideration and study and, in each case, that system selected which, while being as simple as it can be made, at the same time gives the degree of control required. The first consideration must always be the securing of the desired degree of heat control.

With pressure systems the problem of securing the right mixture of gas and air under all conditions of operation is one that has been given a great deal of attention and one which deserves even more attention. In New England the complete premixture system has been used quite extensively. With this system sufficient air for combustion is mixed with the gas at some central plant in the factory, using the gas for industrial purposes. The gas pressure is reduced to zero or atmosphere during the process of mixing and the mixture raised to the pressure required at the burners and pumped through pipe lines to these burners.

There are many advantages to this system for it maintains a constant mixture of gas and air under all operating conditions of the burner and greatly simplifies control and changes in burner capacity at the appliances. But there are no systems without their attendant disadvantages as well as their advantages. In this system the disadvantages are those which go with pumping an explosive mixture through pipe lines and the dangers of such a mixture have to be guarded against by safety devices in the installation.

Partial Pre-Mixture System

The partial pre-mixture system is also widely used. In this system some air is mixed with the gas but not enough to provide for complete combustion. Auxiliary air is taken in at the burner. This system gets away from some of the disadvantages of the complete pre-mixture system while losing some of the advantages of that system.

There are also systems where the mixing of the gas and air is done by small mixing and pressure installations right at the appliance. Some of these are designed especially for intermittent operation; for example, in the tool room where the furnace is used only intermittently but must nevertheless give good results when it is used. Such systems will not give satisfactory results for continuous operation.

Such facts as these demonstrate the importance of studying the requirements with a great deal of care and selecting the system that will best meet these requirements. The system that may serve best under one set of conditions may prove considerably less than best under another set of conditions. Each system is designed to meet certain conditions, and when it is used under those conditions it will give satisfactory results.

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As The Journal Views It

MORE THAN A POSSIBILITY

The development of the desired load during the off-peak season is a "knotty" problem and one that will become increasingly difficult as gas house heating gains in volume.

It cannot be denied that the commercial manager who clamors for a vigorous house heating policy is fired with the very best of intentions. "But where will you get the gas from?" the enginering end of the business will quite properly ask. "By building additional plant equipment," the commercial man will reply.

This, unfortunately, necessitates considerable expenditure in apparatus that would be "eating its head off" by way of interest, depreciation and other charges during the off-peak months of the year. Hence the need for a policy of more than passing caution.

At the present time the method of taking care of such additional equipment would seem to lie along the line of utilizing it for producing some readily saleable by-product, so called. It is patent that additional water gas sets, for example, cannot be put to producing additional gas since there would be no demand for it.

It is provokingly naive for the commercial man to dispose of the matter, as though by a feat of sleight-of-hand, by stating that other industries had met and solved relatively similar problems and therefore everything could be depended upon to turn out all right. However, A. C. Fieldner's well written article, published elsewhere in this issue, throws some light on the question that is certainly far from discouraging.

Our supply of cheap oil for conversion into motor fuel will not last indefinitely. Indeed, some close students of the subject predict rather freely that the present generation will see the price of gasoline rise to a point where it will be prohibitive to the man of modest income. Of course, we have the oil supply contained in the vast deposits of shale in the West to reckon with but the extraction of oil from this source of supply promises to be expensive also. Hence the turning of the scientists' attention to the development of some synthetic motor fuel. To this end the investigation of water gas as a possible source of supply has been going quietly along for a number of years.

Synthetic wood alcohol or methanol, as it is styled, can be produced commercially from water gas. We believe that Mr. Fieldner's article demonstrates this quite clearly. But at the present the price would be too high for ordinary use as a motor fuel. As to the quantity of methanol that could be turned out during the off-peak season it is very likely that the larger gas plants could, with their combined efforts, handle the demand of the motor vehicles in this country; that is, with the necessary additions of equipment based on the meeting of the winter house heating requirements.

Provided the cost of methanol to the ultimate user could be brought down around thirty-five cents a gallon the production of such a synthetic motor fuel would be an assured fact and gas might soon be the predominating fuel for house heating.

To some, the reading of Mr. Fieldner's article will raise the thought that the production of synthetic motor fuel from water gas is, after all, but a mere possibility as far as its larger application is concerned. But, with due allowance for enthusiasm, we believe it is more than a mere possibility.

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SUGGESTION AND CO-OPERATION

The gas business has been one that has suffered but little from petty internal bickering. In fact matters in this regard have been entirely in an opposite direction. There seems to be something in our industry that impels the employee to make suggestions. More, there is an altogether healthy follow-up in order to determine whether the suggestions have sufficient merit to warrant their adoption.

We have had the pleasure, when calling on various gas companies, of seeing "Suggestion Boxes," placed at various points, with their well-worn, rounded edge slots and padlocks whose keyways indicated that such "idea-collectors" received much attention. This is as it should be and indicates fully that our industry is not a one-man proposition.

Quite naturally there is much "chaff" that finds its way into suggestion boxes, to mention nothing of similar matter that is given vent to orally, in meetings of department and sub-department heads.

Mr. Williams seems to have brought out an idea that is certainly worthy of investigation. There is perhaps some meat in his suggestion which warrants more than passing consideration. Admitting that his thought could not be followed entirely it is nevertheless far from being "chaff."

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CASHIER CO-OPERATION

(Continued from page 189)

A Novel Idea

The distribution by the cashier to customers of literature of this sort would be a distinctly novel thing in many cities and it would, therefore, get a lot of attention and create considerable comment and be of consequent good to the gas company in selling more ranges than might otherwise be the case.

The cashier, too, could co-operate in selling more ranges by asking housewives about their experiences with ranges and about the names and addresses of such of their friends and relatives as might be contemplating the purchase of ranges.

Of course, this sort of thing should be done by the cashier only in slack moments when there isn't a rush of other work.

In asking for these things the cashier could call the attention of people to cards provided for their use in giving their comments on the ranges they had purchased and in giving the names and addresses of prospects.

By so doing the cashier would, of course, be getting in touch with many folks who owned old-time ranges that should be replaced with wholly modern ranges and the names and addresses of such folks should be noted as being good prospects and should be turned over to the range salesman so that he could call on them.

Demonstration Literature

The cashier, too, can distribute literature to customers telling them about demonstrations which will be staged at the gas company's office and telling them about better ways of using their gas ranges, and so on. And if all such literature is provided with a coupon for folks to sign and deposit with the cashier when they are interested in purchasing new ranges, this will be found to be a very helpful method indeed of getting in touch with more prospects and in putting more sales across.

The fact of the matter is that every housewife who pays her bill each month at the gas company office is a mighty good prospect for the company unless she has recently purchased a new gas range. And if she has purchased a new range she probably knows of numerous friends and relatives who are interested in the same sort of a range she has bought and she can, therefore, put the company in touch with many good prospects.

In view of all this, therefore, it might be found by numerous gas companies to be a very worth-while thing to plan for greater co-operation from the cashier in helping to sell more ranges.

INDUSTRIAL GAS APPLIANCES AND THEIR USES

(Continued from page 190)

Burner Construction Important

Burner construction is an important feature in securing satisfactory results. In the case of pipe burners care has to be exercised not to have the ports drilled too close together. If they are close enough so that the flames impinge upon each other the combination is not satisfactory. They must be drilled far enough apart so that each flame will have sufficient room to assume its normal shape and size.

It is not always possible to find stock burners that are of the right shape and size to meet the requirements of each job. However, blast tips may be purchased and with pipe and fitting burners of the desired shape and size be readily constructed. These tips come in different sizes and are so constructed as to give proper combustion results. Through their use every condition can be met.

The gas field differs from the electric in that instead of two or three large companies manufacturing everything from all the equipment needed to manufacture and distribute gas to the appliances in which gas is burned, there are many companies each working in its own field. There are companies that specialize in the manufacture of plant equipment. There are many companies manufacturing industrial gas appliances. Each of these industrial gas appliance companies has tried to find a field for itself and stick to that field. It makes appliances that meet certain specific requirements. The result is that there is no great degree of competition between the companies. What competition there is comes largely where the fields of the different manufacturers overlap.

In order to have a manufacturing company as large as the large electric manufacturing companies it would be necessary to have a company that manufactured everything from retorts, coke ovens, and water gas sets, to pipe, fittings, and everything else used in the distribution of gas and then to all sorts of appliances for using gas. In other words, such a company would have to manufacture everything that is used in any way in the making, the distribution and the use of gas.

It is not likely that any such company will be a reality in the gas industry at least for a long time to come, for as conditions now exist there are so many companies each specializing in its own field and not to any degree competing with other companies. Each is developing and manufacturing appliances that are suited to the field in which it is working. Each is specializing and through this specializing we are sure to reach a degree of efficiency that might not so readily be secured without this specializing where success in each field is necessary if the investment each company has made in its business is to be secured and is to bring adequate returns.

The gas man should study with care the products of each individual manufacturer, familiarize himself with the field that is covered by each manufacturer and be in a position to select that equipment which will give the most satisfactory results to the user of the gas.

INDUSTRIAL GAS LESSONS

IF IT'S DONE WITH HEAT — YOU CAN DO IT BETTER WITH GAS

Lesson No. 157

Oil Gas

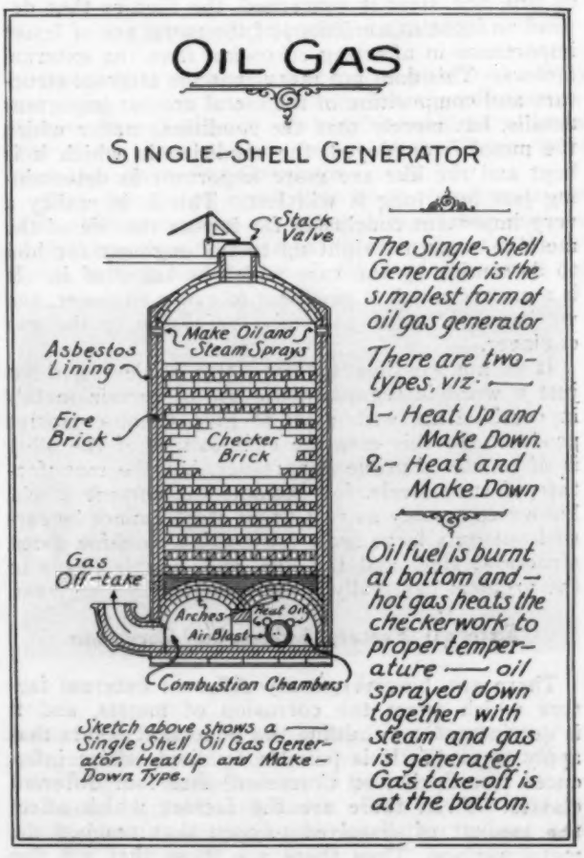
Single Shell Generator

The improved or two-shell generator has been described first in the previous lessons as this is the most efficient form of the oil gas generator. There is, however, a simpler form which is known as the single shell type. This type of oil gas generator is especially well-suited for smaller installations in that it does not cost nearly as much as the two-shell type and is simpler to operate. On the other hand, it is not nearly so efficient for it produces large quantities of lampblack. Thus in selecting the type of generator attention must be paid to the possibility of getting rid of this product in the form of briquetted fuel, and when there is a market for this product, it is possible as well to use the single-shell generator in the larger oil gas works. But it is nevertheless true that the two-shell apparatus is to be preferred for the reason that the oil gas plant is interested in making as much oil gas as possible rather than large productions of carbon black, which simply indicate that oil has been decomposed so far that carbon has been deposited.

Heat Up and Make Down Apparatus

There are two types of this single-shell oil gas generator. One of these is the "heat up and make down" apparatus. This simply means that when the generator is being heated, the passage of heating gases is from bottom to top, and when it is being used for the generation of gas, the passage of the oil is from top to bottom. As may be seen from the accompanying illustration (this has been taken from Prof. Morgan's book on Manufactured Gas, volume 1, page 336), the generator consists of a cylindrical steel shell, installed in the vertical position. Right next to the steel shell there is a layer or two of asbestos and next to that a layer of fire brick, which forms the lining.

The construction of the generator is easily seen from the illustration. At the bottom there are open spaces formed by arches and in these spaces which serve in part as combustion chambers the oil is burnt that is used for heating the checkerbrick. The checkerbrick is located on top of the arches and extends upwards but not filling the generator entirely, there being another open space above the top limit of the checkerbrick. The blast pipe, introducing air into the apparatus, is located at the bottom and there are also oil burners which burn the oil. Steam and oil sprays are located in the upper chamber. The checkerbrick chamber is the place where the oil gas is actually made. A stack is provided at the very top of the apparatus.


OIL GAS
SINGLE-SHELL GENERATOR
Stack Valve
Make Oil and Steam Sprays
Asbestos Lining
Fire Brick
Checker Brick
Gas Off-take
Arches
Heat Oil
Air Blast
Combustion Chambers
Sketch above shows a — Single Shell Oil Gas Generator, Heat Up and Make-Down Type.
The Single-Shell Generator is the simplest form of oil gas generator
There are two types, viz. —
1- Heat Up and Make Down.
2- Heat and Make Down
Oil fuel is burnt at bottom and — hot gas heats the checkerwork to proper temperature — oil sprayed down together with steam and gas is generated. Gas take-off is at the bottom.

CORROSION IN THE GAS INDUSTRY

(Continued from page 188)

Removing the Impurities

The next step in the manufacture of iron and steel is to remove the impurities, and this is done in a variety of ways. Thus the iron may be manufactured into steel by the Bessemer or open-hearth process, or it may be put through the puddling process and converted into wrought iron. The iron can also be refined by the crucible method and made into crucible steel, or in the electric furnace to give electric steel. The iron or steel may be cast into the machine part or else it may be forged into the shaft, etc., the forging being either of the regular pressure hammer type or else of the drop forge type. The finished metal may also be heat treated, a process in which gas finds important use. All these treatments not only change the composition of the iron but also its physical structure and outward appearance as well as its mechanical strength.

A thorough study has been made of the effect of the composition and metallurgical treatment of the iron on its corroding properties, and it has been concluded therefrom that this effect is less than that of the surroundings under which the iron is employed. In other words, as far as the corrosion of iron and steel is concerned, the factors that depend on internal conditions of the metal are of lesser importance in affecting corrosion than the external factors. This does not mean that the internal structure and composition of the metal are not important details, but merely that the conditions under which the metal is employed, the condition in which it is kept and the like are more important in determining just how long it will last. This is in reality a very important conclusion for it puts the life of the metallic structure right up to the engineer for him to determine by the care which he takes of it. It is a matter which is pertinent to every engineer, and we have of course particular reference to the gas engineer.

It is not possible to leave this subject without just a word in regard to the use of certain metals in combination with steel to give a non-corrosive product. In this case the composition of the alloy is of course of prime importance, but the manufacture of such steels, for example the chrome steels, known commonly as rust-proof steel, cannot be carried out on a large scale for making machine parts, structural steel and the like, and so this phase of the problem has really no interest for the engineer.

External Factors Influencing Corrosion

There are, however, many different external factors which affect the corrosion of metals, and it is our intention to outline the important points that apply to each. It is possible to divide these influences (see Speller on Corrosion) into four different classes. First, there are the factors which affect the amount of dissolved oxygen that reaches the metal surface. Then there are those that are due to the dissolved substances in the solutions which come in contact with the metal; thirdly, there are those that affect the localization of corrosion and the amount of pitting; and fourthly, for want of a better name, there are the miscellaneous factors.

Iron will not corrode in dry air. That is a well known fact and holds good unless, of course, the temperature is raised to a very high point. The effect of humidity in the air on metals is easily recognized from the results that are obtained by exposing iron to the action of the moist air near the sea coast, and to the dry, warm air of certain sections of Arizona, for example. Rapid rusting takes place in the first case and the iron is durable for a long time in the second case. Another interesting fact which gas engineers may have observed on holders and other exposed structures around the gas works is that the corrosion of the metal is generally greater on the northern side than on the southern side. This is due to the fact that the water which may be deposited from the air on the surface of the metal which has northern exposure is not evaporated away so quickly as that on the sunny or southern side.

The moisture that is present in the air may be deposited on the surface of the metal which has, of course, greater heat conductivity than the air and hence feels and acts as it were actually colder than the atmosphere, even though the air is not saturated with moisture. It is a fact that unless the surface of the metal is wet, corrosion will not take place, but the film of moisture is often not visible although it is present. Water on the surface of metal will of course absorb oxygen and other gases present in the air, all of which may very well accelerate the rapidity of the corrosion.

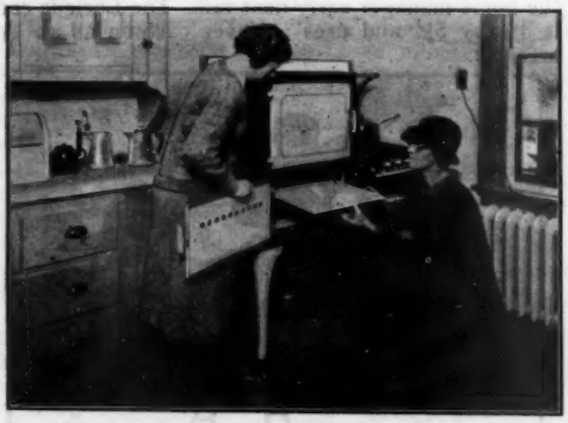
Presence of Oxygen

It has been mentioned above that another important element in corrosion is the presence of oxygen, and this does not mean merely its presence but its contact with the metal. The oxygen that is in the air may be dissolved, as noted above, in the water films covering the metallic surface. It will thus come into intimate contact with the metal. The dissolved gas can be convected away from the surface in contact with the air, through the solution itself, to the metal in its immediate neighborhood. It may also diffuse through the solution to the metal. There are various factors which affect the rate at which oxygen is brought into contact with the metal, such as the amount of agitation at the surface of the liquid, the temperature of the solution, for gases are more soluble in hot than in cold solutions and the like.

We will leave here this first article in the series on corrosion of metals. It will be followed by others in which we will continue to deal with the various factors that affect and control corrosion and with the various means that can be adopted to fight corrosion, and in general with the relation between all these details and the corrosion of the gas holder and other structures in the gas works, as well as the piping in the distribution systems.

AROUND THE TOWN WITH MISS NIXON OF THE PROVIDENCE GAS COMPANY

Miss Nixon, of the Home Service Department, needs little introduction to the thousands of customers who have been greeted by her ever-ready smile and proffer of service when a new domestic appliance has been installed. It is she who instructs you in its use or gets you out of temporary difficulties. Let her tell you some of the interesting happenings of an average day.



Miss Nixon Instructing the Housewife in the Use of Her Range

Work Is Pleasurable

"There is a great deal of real pleasure in work like mine, for it takes me into such a variety of homes—impressive ones, where usually I talk with the cook; the home where only one maid is kept and the head of the home often joins our kitchen party; and the little, new home of the bride, who is, usually, adorable and so blissfully happy that it is very contagious. Her eagerness to learn all about her cooking equipment makes the task of instructing her a very pleasant one. Sometimes we mix up a cake or some biscuits to demonstrate the method. Our lesson usually finishes with 'tea for two,' since everyone knows the proof of the cake is in the eating.

Overcoming Cook's Antagonism

"How different is the task in the home where a most efficient cook reigns. Here one has to overcome her antagonism toward 'fol-de-rol' arrangements that govern the heat of the oven. 'Haven't I cooked for years and always had success? Why, then, bother with that? After talking with her a short while I find she has been disregarding it entirely! Usually the feeling of timidity exists because she does not know just how it functions. It is not difficult to get her to use the regulator when she finds how simple it really is, after all.

"When calling in the foreign sections of our city I am often greeted by the children calling out, 'Here's the nurse!' 'Gee! Here's the teacher!' and similar expressions. But the other day one of our little American girls called upstairs, 'Mother, here's the Gas Lady!' I can lay claim to this last title, but not the others. Won't you call 'The Gas Lady' when in trouble?"

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COVERING HOME SERVICE

Opening new ground, whether it be a food supply or giving gas to a community, has a great fascination to Mrs. Luella M. Fisher, National Director of the Home Service Department of the Eriez Stove and Manufacturing Company.

The photograph speaks for itself, showing at one side the kitchen set-up where Mrs. Fisher goes on and prepares a whole meal dinner, places it in the oven, setting her control at 450 degrees, and at the

Demonstration Set-up

end of an hour and a half takes out meat, potatoes, vegetables and dessert, all beautifully browned and thoroughly cooked so as to best retain the best of all food elements and flavor. This is done with just a few cents' worth of gas—no bother to watch the

fire to see if the temperature is just right, no replenishing of coal or wood, no dirty, back-breaking labor—just let gas do it the clean, easy and best way. Such was the context of the lesson taught by Mrs. Fisher to the housewives and homemakers of the towns of Greenfield and Sabina in Ohio, where gas has but recently been introduced.

While the meal was cooking Mrs. Fisher turned to the other side of the set-up as shown in the photograph and talked on gas and gas appliances and their uses. She showed clearly just each step from the striking of the match and the turning of the cock to the actual lighting of the burners. Tests were made with the various appliances using the glass front one foot test dial meter so that the exact number of cubic feet of gas consumed by each appliance. From this it was easy to formulate plans for household budgets for the heating units of a home and the interested audiences followed every step carefully.

Not only were the adults interested in this new fuel but the youngsters were just as alert. Questions put to the children showed that they had been following the gas men around from the very first, they knew where the regulator stations had been planned, they knew the sizes of the pipe lines, they knew where the gas meters were placed, they knew how they laid the lines. In other words, they were right at the heels of the gas company all the time. Mrs. Fisher lectured at the High Schools in Greenfield and Sabina, and since she believes in teaching them young, showed them every step of the testing of the gas appliances and the budgeting of fuel just as she did their parents.

Spreading the gospel of gas is one of the best things Mrs. Fisher does, and all you have to do is to give her an opportunity on the subject, and she always carries you through many interesting avenues of the how, when, wherefor and why of gas.

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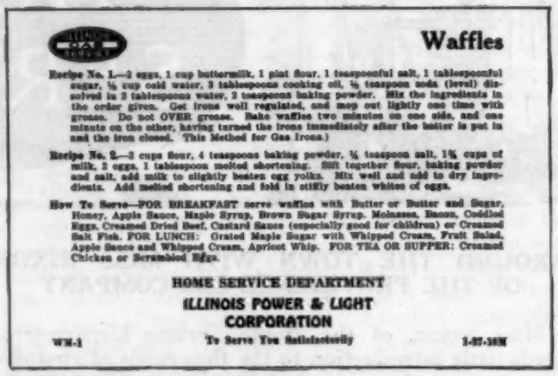
WOMEN RESPOND TO RECIPES

William H. Matlack

OR the past two or three years we have advocated the use of tested recipes, for general distribution to customers by the gas man. We have watched the reaction from the general circulation of the recipes in various forms and we again urge our readers to test and freely distribute more recipes. Let's endeavor to have the home manager serve more home cooked foods—remember we must maintain the 70 per cent domestic load.

To sight what recipes will do to promote the sale of gas we recall an instance where a southern gas company, through their demonstrator, gave out a few copies of a tested fruit cake recipe one fall that created such a demand for home-made fruit cake that they now have made the furnishing of this recipe an annual feature.

The Southern Gas and Power Company, the Laclede Gas Light Company and the Illinois Power and Light Corporation are some of the companies who are now using the tested recipe to promote more and better home cooking.



Waffles

Recipe No. 1.—2 eggs, 1 cup buttermilk, 1 pint flour, 1 teaspoonful salt, 1 tablespoonful sugar, ½ cup cold water, 2 tablespoons cooking oil, ½ teaspoon soda (level) dissolved in 2 tablespoons water, 2 teaspoons baking powder. Mix the ingredients in the order given. Get irons well regulated, and mop out lightly one time with grease. Do not OVER grease. Bake waffles two minutes on one side, and one minute on the other, having turned the irons immediately after the batter is put in and the iron closed. This Method for Gas Irons.)

Recipe No. 2.—2 cups flour, 4 teaspoons baking powder, ½ teaspoon salt, 1¾ cups of milk, 2 eggs, 1 tablespoon melted shortening. Sift together flour, baking powder and salt, add milk to slightly beaten egg yolks. Mix well and add to dry ingredients. Add melted shortening and fold in stiffly beaten whites of eggs.

How To Serve—FOR BREAKFAST serve waffles with Butter or Butter and Sugar, Honey, Apple Sauce, Maple Syrup, Brown Sugar Syrup, Molasses, Bacon, Coddled Eggs, Creamed Dried Beef, Custard Sauce (especially good for children) or Creamed Salt Fish. FOR LUNCH: Grated Maple Sugar with Whipped Cream, Fruit Salad, Apple Sauce and Whipped Cream, Apricot Whip. FOR TEA OR SUPPER: Creamed Chicken or Scrambled Eggs.

HOME SERVICE DEPARTMENT
ILLINOIS POWER & LIGHT CORPORATION
WM-1 To Serve You Satisfactorily 1-27-10M

All of these companies use cards, two of which are reproduced on this page. The Illinois Power and Light Corporation Card is 4 by 6, and according to Miss R. Lee Vande Sande, director of the Home Service Department of that company, is designed to fit into a file case which will be furnished the home manager early next fall. The Laclede card is 3¼ by 5½ and uses a clever cartoon as an eye arrestor.

Chicken in Blanket

DRESS as for roast chicken. Grease and season inside and outside of fowl and put peeled sweet potato and small lump of butter on inside. Place on low rack in deep roasting pan. Sear lightly. Cover close with pie paste, rolled ¼ inch thick. Bake in quick oven (450 degrees) 45 minutes.

FREE COOKING LESSONS
2 P. M. Every Weekday but Saturday
No Charge You are Invited

Home Service Department
The Laclede Gas Light Company
Olive at Eleventh Central 3800
Recipes Broadcast From Station KSD
Every Weekday at 10 A. M.

PASTRY AND POLITICS

Politicans are showing an interest in cookery. At the meeting of the 22nd Assembly District Republican Club, 236 Barbey Street, Friday evening, February 4, 1927, the subject of home cooking and baking was taken up.

Christian J. Bode is the president of this organization, and he invited Miss Ruth Soule of the Brooklyn Union Gas Company to give a lecture on baking of desserts and cakes.

Miss Soule gave a practical demonstration on the preparation of cake and cream puffs, samples of which were distributed among the members attending the meeting.

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OVEN TEMPERATURES

(Arlington Gas Light Co., Arlington, Mass.)

Mixture	Temperature	Time
Layer Cake	375	25 minutes
Loaf Cake	350	40 minutes
Fruit Cake	250	6 hours
Sponge Cake	320	45 minutes
Angel Food Cake	325	1 hour
Baking Powder Biscuit	450	15 minutes
Muffins	400	20-25 minutes
Popovers	450-350	45 minutes
Gingerbread	350	30 minutes
Bread, yeast	375	1 hour
Biscuits, yeast	400	30 minutes
Cookies	400	15-30 minutes
Pie, open	325	1 hour
Pie, two crust	325	50 minutes
Pie, shell	325	30 minutes
Custards and Timbales (baked in pan of water)	325	1 hour
Souffle	400	45-50 minutes
Roast	500-250	After searing allow 20 minutes to each pound
Baked Potatoes	400	45 minutes to 1 hour
Casserole Dishes	350	45-50 minutes.

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BUDGETING

Miss S. Agnes Donham, an authority on budgeting, sets down the following as a guide:

1. Write out what your particular income should provide in the way of shelter, food, clothing, operating and development for your family.
2. Make a list of all possible expenditures.
3. Divide them into five headings: Shelter, Food, Clothing, Operating, Margin for Development.
4. Divide each group into three headings: Charges fixed, Charges possible to estimate, Charges necessary to limit.
5. Estimate tentative income for the year.
6. Decide how much should be saved and subtract it from the total income.
7. Divide the rest of the income into five equal parts and assign one part to each of the five groups of expenditures.
8. Decide what is the minimum amount for which nourishing food can be purchased.
9. Estimate cost of shelter, include rent or interest, taxes, repairs and insurance, business and school carfares.
10. Figure amount required to clothe the family; make a clothing budget.
11. Make complete estimate of all operating expenses.
12. Apportion remainder of income to Development, that is, education, church, social life, philanthropy, health, gifts, new equipment, automobile, etc.

She also offers another suggestion which is very practical. Draw a large circle, with a smaller one inside. The circle in the center is marked Savings; the outside circle is divided into five parts, each one labeled with the name of one of the five main headings—Shelter, Food, Clothing, Operating and Development. Put in each section the amount of money allocated to it. For instance, Miss Donham goes on to say: "Suppose a $2,500 income is taken as an example. Three hundred dollars is taken out for savings and taxes, leaving a balance of $440 for each section. The budget plan shows that $680 is required for food, $360 for shelter, $480 for clothing, $440 for operating and $240 for development. Food evidently will draw heavily upon the other divisions before it is paid for. Shelter does not require all its allotment and $40 taken from that section and $200 from development will provide for the food needs. Clothing requires $40 more than its allotment—take it from shelter."

By readjusting the amounts you arrive at the sum for each division. Once found do your level best to keep within it. If, at the end of the month, there is a balance in your favor, add it to savings.

If the balance is against you, go over your accounts and try to find just where the leak occurred and try to prevent it another time. The extra expense will, of course, have to be paid out of one of the other allotments and that one curtailed to meet the deficiency.

Perhaps you have asked "Just what may rightfully be included under the five main headings?"

Under Shelter—rent, or interest, taxes, fire insurance, repairs and business carfares.

Under Operating—coal, oil, wood, gas, electricity, water, laundry, service, household supplies, repairs and replacements, telephone, miscellaneous operating, house carfare, postage and express.

Under Food—all that goes on the table plus ice and outside meals.

Development is outlined.

Clothing expenses should be budgeted for each member of the family.

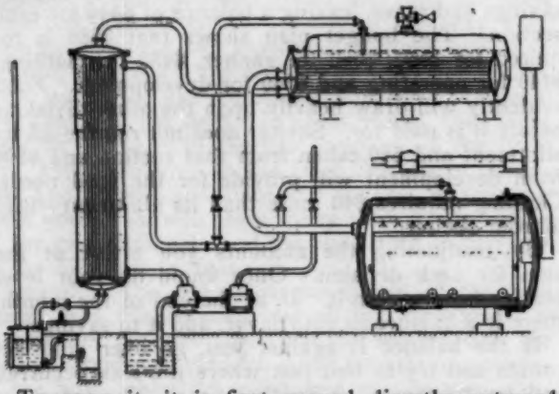
Budgeting is nothing more nor less than telling your money where to go. Save first, then spend what remains judiciously. You will find by so doing you will get more out of life and be a great deal happier.

Miss Donham's book, "Spending the Family Income," will prove very valuable to you when starting a budget. If we in the home service department can be of assistance, please call upon us.—Providence Gas Company.

PROGRESS IN GAS TECHNOLOGY
Domestic and Foreign

HELLER BAMAG COKE QUENCHING SYSTEM

THE coke is electrically fed into a trough-shaped tank which conveys it to the quenching plant and with it enters the quenching chamber. It can be adapted for use with any form of chamber, whether horizontal, inclined or vertical. It should be noted that this is the only movement to which the coke is subjected until it is discharged quenched on to the screens. It arrives in the quenching chamber at a temperature of 900 to 1100 degrees C and the chamber is then made steam-tight by the closing of an electrically atucated cover. This is of special design and rotates at the end of an arm about a pivot, being counterbalanced by a weight at the other end.



To open it, it is first moved directly outwards away from the opening, and then swung round about the pivot. When the cover is tightly shut, the hot coke in the quencher is sprayed with water at about 140 degrees to 150 degrees C. This, of course, gives rise to vapours in the chamber, which consists principally of steam and water gas, but contain also sulphurous acid, sulphuretted hydrogen, and traces of ammonia. This naturally cannot be made use of directly, as it would soon adversely affect any mechanical parts with which it came into contact. The spraying with superheated water soon gives rise to high pressures in the quenching chamber, which amount to as much as 14 atmospheres and more; and these high-pressure vapours are employed for the production of pure, superheated steam, by passing them through the tubular system of the upper boiler.

By the time the gases from the quencher have passed through the upper boiler, most of the water vapour has condensed out, and water gas forms a considerable proportion of the remaining vapours. This, together with the condensates, passes on through the preheater from top to bottom, where practically the whole of the remaining water vapour condenses out, leaving water gas and condensates to pass out through a pressure-retaining valve at the bottom. As can be seen from the plan, the vapours practically maintain the pressure that prevails in the quencher until they have passed the valve at the bottom of the preheater. Here the condensates are run to waste, while the water gas passes through an ascension pipe to mix with coal gas from the settings. The feed water is pumped, of course, in the opposite direction, and leaves the preheater at a temperature of about 140 degrees to 150 degrees C. From here it is directed by appropriate valves either to the upper boiler or to the sprayers in the coke quencher, as required.—(Das Gas u. Wasserfach, 1926, through Gas Journal, 1926, 822.)

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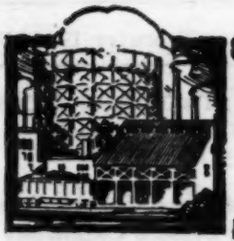
GAS MAKING

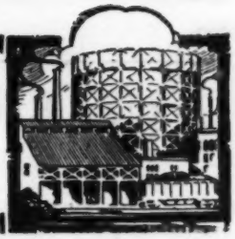
GAS of high calorific power and low specific gravity, suitable for domestic or industrial heating, is made by a process which is featured by the fact that the carbon dioxide in the gas is reduced by contact with semi-coke at a temperature of 750 to 850 degrees C. The semi-coke which is produced by the low temperature distillation process can be used in this process, but the most suitable form of semi-coke is the kind that is made by internal heating. Such semi-coke enables the conversion of carbon dioxide into carbon monoxide to proceed practically quantitatively at much lower temperatures than heretofore—that is to say, temperatures between 750 degrees and 850 degrees C. For example, by employing as reducing agent the semi-coke which is produced from brown coal by internal heating the reduction of the carbon dioxide has been accomplished at temperatures below 800 degrees C.

A suitable gas can be obtained, containing anywhere from twenty to forty per cent of carbon dioxide, from lignite or brown coal by so-called chemical condensation, and the carbon dioxide so produced can be simultaneously reduced with the heating up of the carbon monoxide to suitable temperatures for low temperature distillation purposes. For example, a firebrick lined checkerwork chamber may be heated up to a temperature between 750 and 850 degrees C. by the combustion of carbonaceous materials, either in the gaseous or pulverized state. Fine or coarse particles of carbon may be introduced into the adjacent reducing chamber and a current of gas containing carbon monoxide may be passed into the chamber containing the checkerwork. The gas is heated by direct contact with the checkerwork to the necessary reaction temperature and the heated gas on passing through the reducing chamber is reduced to carbon monoxide in the presence of the semi-coke contained therein.

It is understood that the quantity of the checkerwork and the heat carrying capacity can be so adjusted that a surplus of the so-called sensible heat, after providing for the endothermic reactions due to the reduction of the carbon dioxide, is left so that the carbon monoxide may still leave the reduction chamber at a temperature which is sufficiently high to allow it to be employed for the distillation of carbonaceous materials in any well-known type of retort. British Patent No. 262,834.



NEWS OF THE GAS INDUSTRY



Industrial Gas Division, New England Gas Association, Meets in Boston

Boston.—More than eighty lantern slides were shown by O. M. Olsen, of the Eclipse Fuel Engineering Company, during his talk on industrial appliances and their uses. These slides illustrated different methods of temperature control, including the various types of heat sensitive element and gas control valves as well as the different systems of connecting these two elements. They also showed different types of valves, valve control, one and two-valve systems, mixing systems, and various types of burners and their applications. Some of the slides were of a historical nature showing systems no longer being made while others showed some of the very latest equipment.

The meeting was attended by 57 members and guests and the talk brought forth a good discussion in which J. J. Winn, of Fall River; Stanley P. Roxwell and R. J. Phelon, of Worcester, and E. L. Wood, of Springfield, took part.

In this discussion is was asked if a water seal in a compressor would permit of the picking up enough water to affect the efficiency of the burner. There did not seem to be enough data gathered by those present to answer this question, but it was brought out that there is a need for a better small compressor than is now available.

It was also shown in the discussion that there are cases where the two-valve control is a decided advantage. Where there is need for a very quick control the two-valve system may give very much better results than any other system.

High pressure air and proportional mixture was also given attention in the discussion. It was stated that there is no great variation in the mixture at the burner where this system is used.

Two new members were voted into membership at this meeting, Dexter M. Brooks, foreman, Plymouth Gas Light Co., Plymouth, Mass., and Russell E. Ritchie, Blackstone Valley Gas and Electric Co., Pawtucket, R. I.

President R. J. Phelon appointed as members of the joint refrigeration committee, E. L. Woods, of Springfield, and Russell E. Ritchie, of Pawtucket. At the gas sales division meeting in the evening Governor M. B. Webber appointed to the committee from that division A. J. Hodge, of Gloucester, and Fred Howe, of Newton and Watertown, and these four men now make up the joint committee.

President Phelon urged those present to attend the convention in Worcester in February, stating that arrangements were being made to show those present some interesting industrial installations there.

* * *

Additions to Sales Organization, Hoffman Heater Company, Louisville, Ky.

M. A. McCammond, formerly connected with a Columbus supply house, has joined the Hoffman organization as a member of the sales force at our Columbus, Ohio, branch.

J. T. Godsey has been assigned to Northwestern Texas and will travel out of our Dallas branch.

K. L. Williams has been placed in charge of the Hoffman sales in Northeastern Ohio, with headquarters at 3106 Cherry Street, Erie, Pa. To assist him in this territory he has engaged G. O. Loesel.

Ira Artman has joined the Hoffman organization and has been assigned to our Pittsburgh branch.

Mr. John F. Kurfiss, doing business under the Hoffman Heater Sales Company, at 887 Massachusetts Avenue, Indianapolis, Indiana, has been appointed distributor of Hoffman Heaters in the Hoosier City. They have a very attractive showroom and are equipped to give the utmost in cooperation and service of the Hoffman dealers in Indianapolis.

George Osten, doing business as the Omaha Gas Appliance Company, at 1527 S. 27th Street, Omaha, Nebraska, has been appointed the distributor of Hoffman Heaters in Omaha. Mr. Osten also has a very attractive showroom and is equipped to give Hoffman super-service to the dealers in Omaha.

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SECOND GAS CHANGE PUT UP TO STATE

Natural Supply to Be Used By Southern California Company After 26th Inst.

Los Angeles, Cal.—The Southern California Gas Company recently notified the State Railroad Commission that it will serve straight natural gas to consumers after the 26th inst., instead of the mixed gas now provided, at the new rate fixed by the commission of 72 to 92 cents per 1,000 cubic feet. This rate, according to the commission, gives the consumers the same number of heat units for their money as the present rate, as the straight natural gas is more efficient. The company has about 30,000 customers.

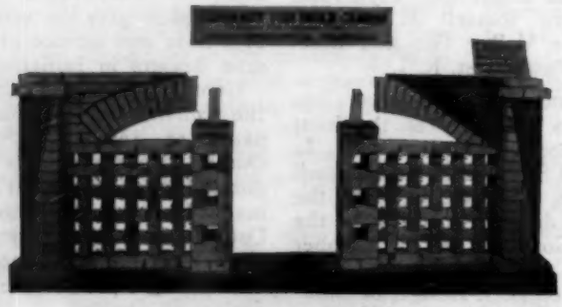
The Los Angeles Gas and Electric Corporation took the same step several days ago and will turn natural gas into its mains after the 25th inst.

Gas Engineer Brown of the commission issued a warning to the public that gas appliances be watched carefully after the change is made, and that any that do not appear to be working properly should be called to the attention of the serving company. Adjustments, he said, will be made without charge.

Botfield Refractories Co. Have Unusual Display

Philadelphia.—At the Midwestern Engineering Exposition (Chicago Power Show) held in the Coliseum at Chicago from February 15th to February 19th, Botfield Refractories Company, Swanson and Clymer Streets, Philadelphia, Pa., displayed two unusual single ring arches, built with Adamant Fire Brick Cement. In these arches approximately 150 pounds of refractories are supported by a thin layer of Adamant Cement. In addition, there were displays of the various uses of Adamant Cement in boiler furnace fire brick construction, as well as data on Adamant service in representative power plants.

In attendance at the Adamant booth (No. 440, located on the main floor, north and south aisle in the North Hall), were Mr. Axel H. Engstrom, sales manager; Mr. W. B. Smith, refractories engineer, and Mr. H. F. Krieg, Chicago representative.



Botfield Refractories

Botfield Refractories Co. Appoint Distributors

Philadelphia, Pa.—The following have been appointed distributors for Adamant Fire Brick Cement: Southern Steel and Cement Company, Asheville, North Carolina; Henry A. Petter Supply Company, Paducah, Kentucky; Columbia Supply Company, 823 West Gervais Street, Columbia, South Carolina; Spartanburg Mill Supply Company, 218 Ezell Street, Spartanburg, South Carolina.

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STOLE GAS BILLS, COLLECTED THEM

Confesses He Obtained $700 By This Expedient

New York.—By the simple expedient of taking gas bills from the house letter boxes and then asking the tenants to pay them, Charles Falk admitted that he had collected $700 in the last few months.

GAS COMPANY'S PLANT IS PRAISED BY COMMITTEE

Steel Corporation Officer Heads Group in Trip to Inspect Apparatus

Rochester, N. Y.—Coke and gas production methods employed by the Rochester Gas and Electric Corporation are among the most progressive and efficient in the United States; its plant is modern, and a number of pieces of the production apparatus are the only ones of their kind in this country, C. A. Meissner of New York, assistant to the president of the United States Steel Corporation, declared, following a tour of the lighting company's plants.

Mr. Meissner is chairman of the United States Steel Corporation's Coke Committee, consisting of nine members representing its largest plants. The committee came here for a two-day meeting.

CENTRAL STATION GAS DISTRIBUTION PROVING SUCCESS

Obtaining of Local Supply From Troy Plant Lessens Complaints Materially

Schenectady, N. Y.—According to a check made by the officials of the Adirondack Power and Light Corporation, the central station gas distribution in this city has increased its efficiency to a marked degree. During the year period in which the local gas supply has been brought from the Troy plant of the Hudson Valley Coke and Products Corporation under high pressure, the number of individual interruptions and complaints has dropped enormously.

Compression of the gas in the Troy plant makes possible the delivery here of gas practically free from moisture, which is the biggest item in causing freezing of mains and intakes. Prior to the installation of the high pressure system, it was usual for the repair department to receive from 50 to 100 calls a day due to freezing.

In only three instances has it been necessary for the auxiliary plant on Broadway to be put into service and this despite the fact that the city is now using more gas than ever before—3,500,000 cubic feet daily.

The Schenectady-Albany-Troy central station is the largest of its kind in eastern United States, producing daily 10,000,000 cubic feet. A 12-inch high pressure main connects this city with Troy, the cost of the line being in excess of $100,000. The main passes under the Hudson river.

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C. M. Crawford Made District Manager

Announcement has been made by Mr. George R. Horning, vice-president in charge of operations for the Southern Gas & Power Corporation, that Mr. C. M. Crawford, formerly operating manager with headquarters in Philadelphia, Pennsylvania, has been made district manager for the Southern District, effective January 1st.

Sargent Honored with Presidency

Completes March of Progress From Humble Position to Head of Lawrence Gas & Electric Co.—Fred Harmon Is Made Assistant Treasurer.

Lawrence. — Another chapter was written in the book "From Office Boy to President" when the directors of the Lawrence Gas & Electric Company elected Fred H. Sargent, present vice-president and agent, to the position of president of the Lawrence Gas & Electric Company. The retiring president, Irvin McD. Garfield, was made chairman of the board of directors.

President Fred H. Sargent is one of the best known men in Lawrence. It is generally admitted that he has a more extensive personal acquaintance than any other man in the community. One reason for this is attributed to the fact that during the past thirty-seven years while he was working his way up from the most menial position to the highest office in the gift of the company that was accorded to him Thursday, he has been in close contact with the general public and thousands of the company's customers. Countless greater Lawrence people will receive with pleasure the news of his advancement.

Fred H. Sargent is a product of the Lawrence public schools and the Lawrence Public Utilities. After leaving the high school he entered the employ of the Lawrence Gas Company November 26, 1889, occupying the position of timekeeper and record clerk at the gas works on Marston Street.

From that time until the present his connection with the company has been one continued round of hard work and advancement. From timekeeper and record clerk through every department of the company Mr. Sargent's progress has been marked by an unusually keen degree of loyalty on the part of his coworkers, and to them he ascribes all of the credit for his success with the company.

The first major step in Fred Sargent's connection with the company and which started him on the road that made possible his splendid promotion came in 1904, when he was made assistant to Agent C. J. R. Humphreys, who at that time was an outstanding figure in the gas industry. In 1919, on the death of Mr. Humphreys, Fred Sargent was made agent. He was later made vice-president and agent, which positions he held until Thursday.

Fred H. Sargent

In his climb to the head of the organization, President Sargent has maintained and held the esteem and confidence not only of the entire personnel of the company, but also of the directors, the public and the leading men in the gas and electric light industries throughout the country.

Mr. Sargent's election marks for the first time in the seventy-eight years of the company's existence a president who was a resident of Lawrence, and it also marks one of the comparatively few instances in the United States where a great public utility has selected its president from one who has come up from the lowest position possible in the company ranks.

Harmon Promoted

Fred C. Harmon, for many years cashier of the Lawrence Gas & Electric Company, has been promoted to the position of assistant treasurer. This action was taken at the meeting of the board of directors at Boston.

Mr. Harmon has been with the local company more than thirty years, and the promotion is considered by company employees as being a well deserved recognition for efficient and faithful service.

Fred C. Harmon is widely known throughout the city and is active in a number of organizations, especially the local Lion's Club. He is married and lives at 5 Sheridan Street with his wife, Rose L., and two daughters, Rosamond, a student at Boston University, and Marion who attends the Lawrence High School.

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GAS SUPPLY ADDED FOR TUSCALOOSA

Company to Spend $100,000 to Meet City's Growth

Tuscaloosa, Ala.—In the next few weeks the Alabama Power Company will expend, it is said, about $100,000 in equipment and improvements at its gas plant here. The company is extending its main in all directions and with a large increase of consumers of gas in the city the improvements were made necessary to meet the expansion program under way. The plant is located at Holt, five miles from here where the company gets its gas from the Semet Solvay Company and is brought to Tuscaloosa through large mains.

* * *

Name Hughes to Board of Utility

Colorado Springs, Col.—E. W. Hughes, who represents Glidden, Morris and Company in this city, was elected a director of the Northwest Louisiana Gas Company of Shreveport, La., at a recent meeting held in New York. The Northwest Louisiana Gas Company recently issued $1,200,000 first mortgage bonds, the issue being oversubscribed.

New Continuous Vertical Retort Plants

New York.—West Gas Improvement Company of New York have been recently awarded contracts for the following Glover-West Vertical Retort installations: Springfield, Mass., 2,800,000 cu. ft. per day; Toronto, Ont., 600,000 cu. ft. per day.

Following the decision of the Springfield Gas Light Company not to move from their present site, which is coupled with the fact that the new model Glover-West Vertical Retort increases largely the ultimate coal gas making capacity that the present site is capable of holding, it was decided to instal new coal gas plant of this system in part of the inclined retort house between the two present batteries of verticals. The plant will be practically duplicate to that installed at Malden, Mass., which started gas making early in 1925, and will consist of 40 retorts of the latest model in four benches of ten. As the Springfield Gas Company already has Glover-West plant of a capacity of 2,250,000 cu. ft. per day, they will have for the next winter load 5,000,000 cu. ft. capacity coal gas, all from Glover-West plant, in addition to their water gas equipment. Messrs. Charles H. Tenney of Boston, Mass., are engineers of both the Malden and Springfield gas undertakings. The roof over the existing batteries will be raised so that eventually these older batteries built in 1914, may be remodelled.

The Toronto plant for the Consumers' Gas Company forms an addition to the 5,000,000 cu. ft. plant put into operation at the beginning of 1926.

* * *

R. H. Maurer Becomes Operating Vice-President of the Spencer Thermostat Co.

New York, N. Y.—R. H. Maurer has resigned the presidency of the Automatic Safety Appliance Corp. and will be operating vice-president of the Spencer Thermostat Co., of Cambridge, Mass., from the 1st of February. This company holds the patents for the "Million Dollar Thermostat" used by the Westinghouse Co.

The Spencer Thermostat Co. will in future devote their time to the development of the Spencer Thermostatic Disc for gas appliances.

Convention Calendar

February

23-24—New England Gas Association. Annual convention, Hotel Bancroft, Worcester, Mass.

23-24—Pacific Coast Gas Association. Regional conference, Los Angeles. Clifford Johnstone, secretary, 447 Sutter Street, San Francisco, Cal.

24-25—Wisconsin Utilities Association Convention. Gas Section. Racine, Wis. John N. Cadby, secretary, Madison, Wis.

March

8-10—Oklahoma Utilities Association. Annual meeting, Huckins Hotel, Oklahoma City. E. F. McKay, manager, Oklahoma City, Okla.

17-18—Illinois Gas Association. Annual convention, Springfield. R. V. Prather, secretary, Springfield, Ill.

April

4-5—American Gas Association. Distribution Conference of Technical Section, Baltimore, Md.

6—Pennsylvania Gas Association. Annual meeting, Bellevue-Stratford Hotel, Philadelphia, Pa. G. L. Cullen, secretary-treasurer, Harrisburg, Pa.

7-8—Eastern States Gas Conference. Annual meeting, Bellevue-Stratford Hotel, Philadelphia, Pa. J. Calhoun Smith, secretary, Reading, Pa.

7-8—New Jersey Gas Association. Annual meeting, Bellevue-Stratford Hotel, Philadelphia, Pa. Louis Stoker, secretary, Newark, N. J.

19-22—Southern Gas Association. Annual meeting, Biltmore Hotel, Atlanta, Ga. J. P. Connolly, secretary, 141 Meeting Street, Charleston, S. C.

20-22—Midwest Gas Association. Annual convention, The St. Paul, St. Paul, Minn. H. R. Sterrett, secretary, 551 Seventh Street, Des Moines, Iowa.

26-29—Southwestern Public Service Association. Annual meeting, New Orleans, La. E. N. Willis, secretary, 403 Slaughter Bldg., Dallas, Texas.

Lathrop Elected Chairman

New York, N. Y.—At a meeting of the directors of the American Light and Traction Company, Alanson P. Lathrop, who had been president of the company since 1909, was elected chairman of the board, and R. B. Brown, who had been vice-president and general manager of the Milwaukee Gas Light Company for several years, was elected president of the company to succeed Mr. Lathrop.

New England Association Dinner Dance

Worcester.—The committee in charge of the dinner dance and entertainment to be given Wednesday evening, February 23rd, at the Bancroft Hotel, Worcester, Mass., the opening night of the New England Gas Association Convention, have completed plans for an elaborate entertainment of a novel character.

The nature of the entertainment is to be a surprise for the New England gas men. It is estimated that about five hundred will attend the dinner. Messrs. R. L. Fletcher, Providence Gas Co., F. A. Woodhead, Arlington Gas Co., and C. C. Curtis, Fall River Gas Works Co., are in charge of the entertainment features. "'Nuff sed."

Mrs. Guy E. Stephen, Worcester, is at the head of the committee to arrange entertainment for the ladies who attend the convention. Many interesting side trips have been arranged and the visiting ladies are promised a good time.

The committee in charge of entertainment is: Mr. E. H. Bauer, Worcester Gas Light Co., chairman; Mr. A. H. Scott, New Britain Gas Light Co.; Mr. M. E. Abbott, Glenwood Range Co.; Mr. C. C. Curtis, Fall River Gas Light Co.; Mr. R. L. Fletcher, Providence Gas Co.; Mr. F. A. Wood-Mr. C. S. Hilton, Pawtucket Gas head, Arlington Gas Light Co.; Co.; Mr. J. F. Power, Worcester Gas Light Co.

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Presidency of the Automatic Safety Appliance Corporation Not As Yet Filled

New York, N. Y.—Due to the resignation of R. H. Maurer as president of the Automatic Safety Appliance Corp., of New York City, manufacturers of the ASAC Automatic Safety Pilot, the presidency will remain vacant until the annual directors' meeting in March.

In the meantime the duties of president are being fulfilled by V. V. Lebejeff, vice-president. The other officers of the company are T. L. McConchie, treasurer, and F. B. Bard, secretary.